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* Page numbers beginning with A-1 have been assigned to all Appendix pages except the copies of Pl. Exs. 646 and 698.

Appendix Item 1

Table 1 From Pl. Ex. 30

Decreed and Permitted Well Data Base and Summaries — (Bent County, Prowers County, Pueblo County and Crowley/Otero Counties)

Table 1
From Pl. Ex. 30

Cumulative Number and Capacity of
Irrigation Wells

1948-1985

YEAR	UPSTREAM OF JOHN MARTIN RESERVOIR NUMBER	UPSTREAM OF JOHN MARTIN RESERVOIR CAPACITY (CFS)	DOWNSTREAM OF JOHN MARTIN RESERVOIR NUMBER	DOWNSTREAM OF JOHN MARTIN RESERVOIR CAPACITY (CFS)
1948	792	866	57	128
1949	815	884	63	142
1950	864	935	77	181
1951	927	995	87	210
1952	962	1021	108	283
1953	1051	1126	137	380
1954	1162	1240	168	474
1955	1284	1386	201	564
1956	1331	1439	227	649
1957	1380	1504	248	707
1958	1388	1507	253	722
1959	1419	1528	260	741
1960	1475	1598	290	819
1961	1508	1628	310	880
1962	1522	1638	319	899
1963	1576	1697	416	1115
1964	1713	1846	527	1373
1965	1783	1930	594	1531
1966	1789	1932	609	1581
1967	1794	1939	623	1631
1968	1794	1939	642	1703
1969	1800	1950	65?	1730
1970	1803	1952	661	1737
1971	1804	1953	637	1750
1972	1809	1956	678	1775
1973	1810	1957	686	1797
1974	1813	1961	693	1816
1975	1813	1961	701	1843
1976	1813	1961	721	1898

YEAR	UPSTREAM OF JOHN MARTIN RESERVOIR NUMBER	CAPACITY (CFS)	DOWNSTREAM OF JOHN MARTIN RESERVOIR NUMBER	CAPACITY (CFS)
1977	1816	1962	726	1909
1978	1816	1962	726	1909
1979	1816	1962	727	1914
1980	1816	1962	727	1914
1981	1816	1962	727	1914
1982	1816	1962	727	1914
1983	1816	1962	727	1914
1984	1816	1962	727	1914
1985	1816	1962	727	1914

LOCATION: PUEBLO, OTERO, CROWLEY, BENT AND PROWERS COUNTIES.
TOWNSHIP 20-24 SOUTH AND RANGE 41-65 WEST

SOURCE: DECREED AND PERMITTED WELL DATA BASE, SPRONK WATER ENGINEERS, INC.

FILE: WELLSUMM1.WK1

Appendix Item 2

Excerpt from Pl. Ex. 129

Report by Douglas R. Littlefield, Ph.D.,
"The History of the
Arkansas River Compact,"
August 1990

Volume II
Page 387

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. . . Third, the fundamental idea of maintaining the status quo was well understood by all concerned parties, including both states' negotiators, their constituent water users, and the Bureau of Reclamation.

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Appendix Item 3

Pl. Ex. 580

Trinidad Effects, 1979-84, Based on
Bureau of Reclamation,
Final Report on Review of Operating Principles,
Trinidad Project, 1988

Pl. Ex. 580

TRINIDAD EFFECTS
(1000 Acre-feet)

YEAR	CASE I		CASE II	
	NET EFFECT ON JOHN MARTIN (Table 4 - Col. 3)	DEPLETION TO CONSERVATION STORAGE	NET EFFECT ON JOHN MARTIN	DEPLETION TO CONSERVATION STORAGE
1979	−3.1	−1.7	−4.0	−1.8
1980	−4.1	−11.1	−9.0	−17.5
1981	1.1	−2.8	−1.5	−2.3
1982	−1.8	−3.2	−5.4	−3.3
1983	4.3	−4.7	1.7	−2.0
1984	7.0	−1.0	6.6	−1.0
TOTAL	3.5	−24.5	−11.6	−27.5
AVERAGE	0.6	−4.1	−1.9	−4.5

Appendix Item 4

Pl. Ex. 646

Number of Days When Flow of the Arkansas River at the Stateline is All Used in Kansas (1949-1986)

NUMBER OF DAYS WHEN FLOW OF THE ARKANSAS RIVER
AT THE STATELINE IS ALL USED IN KANSAS

COMPARISON OF C. L. PATTERSON'S DEFINITION OF USABLE FLOW
AND THAT ACTUALLY USED BASED ON OBSERVED FLOWS.

USGS WATER YEAR		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT-MAR TOTAL	APR-SEP TOTAL	ANNUAL TOTAL	% OF TIME STATELINE FLOW IS ALL USED IN KANSAS		
																	OCT-MAR	APR-SEP	ANNUAL
1949	PATTERSON	8	26	27	26	0	0	30	31	19	31	21	10	87	142	229	48%	78%	63%
	ACTUAL	10	0	0	0	0	0	0	0	0	0	0	0	10	0	10	6%	0%	3%
1950	PATTERSON	13	25	31	28	0	0	30	31	29	31	31	18	97	170	267	53%	93%	73%
	ACTUAL	0	0	0	0	0	0	7	13	13	0	0	0	0	33	33	0%	18%	9%
1951	PATTERSON	23	25	27	26	0	0	30	25	26	31	31	8	101	151	252	55%	83%	69%
	ACTUAL	0	0	0	0	0	0	0	6	0	0	0	0	0	6	6	0%	3%	2%
1952	PATTERSON	18	23	28	26	0	0	30	31	30	31	31	30	98	183	279	53%	100%	76%
	ACTUAL	1	0	0	0	0	0	0	0	28	31	28	30	1	112	113	1%	61%	31%
1953	PATTERSON	31	30	31	31	28	31	30	31	30	31	30	30	182	182	364	100%	99%	100%
	ACTUAL	31	17	0	3	10	25	30	31	30	27	18	30	82	166	248	45%	91%	68%
1954	PATTERSON	31	[illegible]	31	31	28	31	30	31	30	30	25	30	182	176	358	100%	96%	98%
	ACTUAL	31	22	2	3	0	1	22	31	30	25	21	30	59	159	218	32%	87%	60%
1955	PATTERSON	31	30	31	31	28	31	30	29	30	31	28	30	182	178	360	100%	97%	99%
	ACTUAL	24	9	3	4	2	9	11	18	1	28	23	24	48	103	151	26%	56%	41%
1956	PATTERSON	31	30	31	31	29	31	30	31	30	30	30	30	183	181	364	100%	99%	99%
	ACTUAL	30	17	0	0	1	0	27	27	29	25	27	30	48	165	213	26%	90%	58%
1957	PATTERSON	31	30	31	31	28	31	30	29	30	30	23	10	182	152	334	100%	83%	92%
	ACTUAL	31	30	15	20	14	29	8	15	0	11	18	17	139	87	226	76%	37%	56%
1958	PATTERSON	14	30	31	31	29	1	30	30	30	30	31	30	135	181	316	74%	99%	87%
	ACTUAL	11	0	0	0	0	0	0	0	0	2	6	11	11	19	30	6%	10%	8%
1959	PATTERSON	19	30	31	31	8	0	30	31	30	31	29	10	119	161	280	65%	88%	77%
	ACTUAL	18	18	0	0	0	0	0	1	8	24	18	19	36	70	106	20%	38%	29%
1960	PATTERSON	18	28	31	31	4	0	30	31	30	31	31	30	110	183	293	60%	100%	80%
	ACTUAL	0	0	8	2	1	0	0	9	8	28	31	30	3	102	105	2%	56%	29%
1961	PATTERSON	31	30	31	31	28	31	30	31	28	31	31	30	182	182	364	100%	99%	100%
	ACTUAL	31	30	2	1	1	24	30	31	11	30	30	30	89	182	251	49%	99%	69%
1962	PATTERSON	20	30	31	31	15	0	30	30	30	31	31	30	127	182	309	70%	99%	85%
	ACTUAL	26	2	0	0	0	0	7	18	4	24	28	27	28	108	136	15%	59%	37%
1963	PATTERSON	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
	ACTUAL	31	30	31	12	1	15	30	31	23	28	31	30	120	173	293	66%	95%	80%
1964	PATTERSON	31	30	31	31	29	31	30	29	30	31	31	30	183	181	364	100%	99%	99%
	ACTUAL	28	30	27	12	8	27	30	29	11	31	31	30	132	182	294	72%	99%	80%
1965	PATTERSON	31	30	31	31	28	31	30	31	20	20	3	0	182	104	286	100%	57%	78%
	ACTUAL	31	30	31	31	28	31	30	30	16	0	0	0	182	76	258	100%	42%	71%
1966	PATTERSON	23	22	22	13	0	0	30	31	26	31	6	0	83	126	209	46%	69%	57%
	ACTUAL	0	0	0	0	0	0	0	23	14	10	1	0	0	48	48	0%	26%	13%
1967	PATTERSON	21	30	31	31	28	8	30	30	30	31	12	0	140	133	282	82%	73%	77%
	ACTUAL	0	2	0	0	0	0	11	24	0	0	0	5	2	40	42	1%	22%	12%
1968	PATTERSON	12	30	31	31	20	0	30	31	30	31	31	30	124	183	307	68%	100%	84%
	ACTUAL	17	0	0	0	9	9	20	21	3	29	21	30	26	115	141	14%	63%	39%
1969	PATTERSON	31	30	31	31	28	31	30	30	30	31	31	29	182	181	363	100%	99%	99%
	ACTUAL	31	30	17	0	0	0	0	3	8	11	19	2	78	43	121	43%	23%	33%
1970	PATTERSON	29	30	31	31	18	0	30	31	30	31	31	30	139	183	322	76%	100%	88%
	ACTUAL	0	0	0	0	9	0	0	23	19	23	27	28	9	120	129	5%	66%	35%
1971	PATTERSON	29	30	31	31	10	0	30	31	30	31	31	30	131	183	314	72%	100%	86%
	ACTUAL	15	0	0	0	0	1	30	29	18	31	31	30	16	167	183	9%	91%	50%

PLAINTIFF'S EXHIBIT
646
Orig. No. 105

NUMBER OF DAYS WHEN FLOW OF THE ARKANSAS RIVER AT THE STATELINE IS ALL USED IN KANSAS

COMPARISON OF O. L. PATTERSON'S DEFINITION OF USABLE FLOW AND THAT ACTUALLY USED BASED ON OBSERVED FLOWS.

USGS WATER YEAR		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT-MAR TOTAL	APR-SEP TOTAL	ANNUAL TOTAL	% OF TIME STATELINE FLOW IS ALL USED IN KANSAS OCT-MAR	APR-SEP	ANNUAL
1972	PATTERSON	31	30	31	31	29	13	30	31	30	31	31	30	165	183	343	89%	100%	94%
	ACTUAL	31	30	31	29	28	31	30	31	30	31	23	7	180	152	332	98%	83%	91%
1973	PATTERSON	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
	ACTUAL	31	4	4	3	0	0	0	0	11	31	31	30	42	103	145	23%	56%	40%
1974	PATTERSON	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
	ACTUAL	31	30	31	16	0	0	11	28	30	31	31	30	108	181	287	59%	99%	79%
1975	PATTERSON	31	30	31	31	28	31	30	31	29	31	31	30	182	182	364	100%	99%	100%
	ACTUAL	31	30	31	31	28	18	27	26	14	19	31	30	109	147	316	83%	80%	87%
1976	PATTERSON	31	30	31	31	29	31	30	31	30	31	31	30	183	183	366	100%	100%	100%
	ACTUAL	31	30	31	31	29	31	30	31	30	31	31	30	183	183	366	100%	100%	100%
1977	PATTERSON	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
	ACTUAL	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
1978	PATTERSON	31	30	31	31	28	31	30	31	29	31	31	30	182	182	364	100%	99%	100%
	ACTUAL	31	30	31	31	28	31	30	31	28	31	31	30	182	181	363	100%	99%	99%
1979	PATTERSON	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
	ACTUAL	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
1980	PATTERSON	31	30	31	31	29	31	30	31	30	19	31	30	183	171	354	100%	93%	97%
	ACTUAL	31	30	31	31	29	31	30	31	30	31	12	30	183	164	347	100%	90%	95%
1981	PATTERSON	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
	ACTUAL	31	30	31	17	0	23	30	31	30	31	31	30	132	183	315	73%	100%	86%
1982	PATTERSON	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
	ACTUAL	31	30	31	31	28	31	30	31	30	31	31	30	182	183	365	100%	100%	100%
1983	PATTERSON	31	30	31	31	28	31	30	31	30	31	23	30	182	178	357	100%	98%	98%
	ACTUAL	31	30	31	1	20	31	21	31	30	31	31	30	144	174	318	79%	95%	87%
1984	PATTERSON	15	30	31	31	16	0	30	31	30	24	31	21	123	187	290	67%	91%	79%
	ACTUAL	31	30	31	19	7	25	14	22	30	28	30	30	143	154	297	78%	84%	81%
1985	PATTERSON	12	24	28	31	0	0	30	31	13	29	13	0	96	116	211	52%	63%	58%
	ACTUAL	18	0	0	0	0	3	23	8	0	29	14	7	21	79	100	12%	43%	27%
1986	PATTERSON	19	25	29															
	ACTUAL	0	0	0															
AVERAGES (W/O 1986)																			
	PATTERSON	28	29	30	30	21	18	30	31	29	30	28	24	154	171	325	85%	93%	89%
	ACTUAL	22	17	14	10	9	13	17	21	17	22	21	22	85	120	205	47%	66%	56%
MINIMUMS (W/O 1986)																			
	PATTERSON	8	22	22	16	0	0	30	25	13	19	3	0	83	104	209	46%	57%	57%
	ACTUAL	0	0	0	0	0	0	0	0	8	0	0	0	0	0	8	0%	0%	2%
MAXIMUMS (W/O 1986)																			
	PATTERSON	31	30	31	31	29	31	30	31	30	31	31	30	183	183	366	100%	100%	100%
	ACTUAL	31	30	31	31	29	31	30	31	30	31	31	30	183	183	366	100%	100%	100%
PERCENTAGE OF TIME ALL STATELINE FLOW IS USED IN KANSAS (W/O 1986)														NOV-MAR AVERAGE	APR-OCT AVERAGE				
	PATTERSON	83%	97%	98%	97%	74%	59%	100%	99%	98%	97%	89%	80%	93%	92%				
	ACTUAL	71%	56%	44%	34%	31%	43%	56%	67%	56%	72%	69%	73%	42%	66%				
USABLE FLOW PERCENTAGES (PER HCI)																			
	HCI	62%	35%	35%	35%	35%	35%	62%	62%	62%	62%	62%	62%	35%	62%				

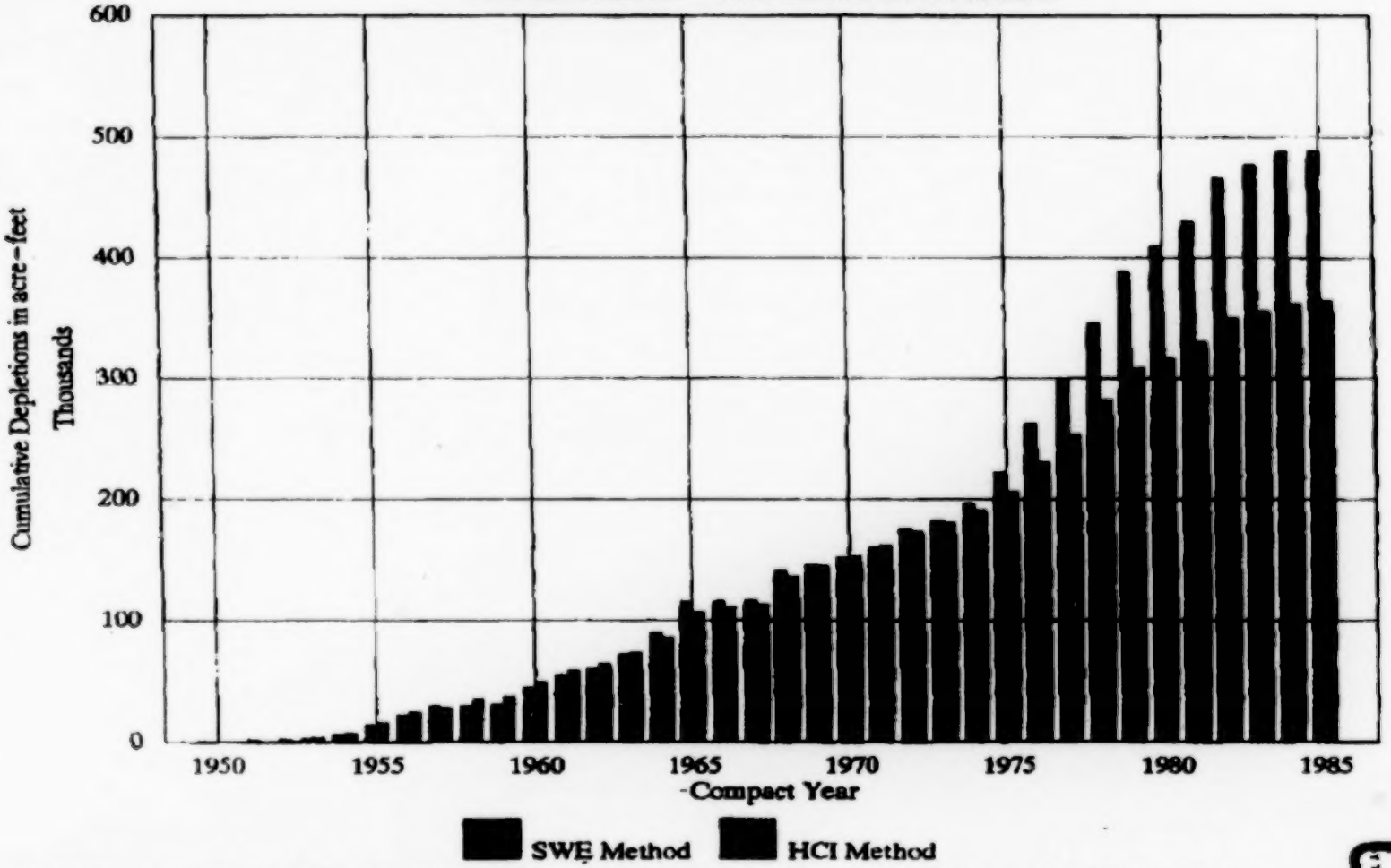
Appendix Item 5

Pl. Ex. 698

Usable Stateline Depletions, Combined Effects - SWE Method and HCI Method (Cumulative), 1950-1985

Usable Stateline Depletions

Combined Effects – SWE Method & HCI Method



Note: For compact year 1950, depletions were assumed to be zero for months of November and December.
Values shown are derived from Pl. Exhibits 560** and 647.

PLAINTIFF'S EXHIBIT
698
Case No. 105

Appendix Item 6

Excerpt from Def. Ex. 134*

**Boyle Engineering Corporation and
Tipton & Kalmbach, Inc.,
Arkansas River Basin Study,
Results of Winter
Water Storage Program Simulation
(December 1990)**

Columns (1) and (16) from Page 8.1, Def. Ex. 134*
POTENTIAL IMPACT OF WINTER WATER
STORAGE SIMULATION
** PASS #2 ** (ACRE-FEET)

.....

COMP YEAR (1)	— CHANGE IN STATE LINE FLOW — ANNUAL (16)	
1950	230	
1951	221	
1952	148	
1953	−137	
1954	106	.....
1955	63	
1956	−101	
1957	−233	
1958	−281	
1959	−162	
1960	−217	
1961	10	
1962	105	
1963	−57	
1964	−103	
1965	−350	
1966	−393	
1967	−540	
1968	−919	
1969	−1178	
1970	−895	
1971	−1259	
1972	−1116	
1973	−731	
1974	−447	
1975	−636	
1978	−693	
1950−75 & 78 AVG	−354	

Notes:

(a) A positive value indicates an increase in river gain, diversion or storage as a net result of the simulation of the winter water storage program.

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Appendix Item 7

Excerpt from Def. Ex. 1011

Changes in Stateline Flow
ADMIN.FOR (Dec. 1991 version and Feb. 24, 1992
version of RIGHT.DAT)
and Modified HI Model (Sep. 1992)

CHANGES IN STATELINE FLOW
ADMIN.FOR (Dec. 1991 version and Feb. 24, 1992 version of RIGHT.DAT)
and Modified HI Model (Sep. 1992)

INSTITUTIONAL CONDITIONS						TOTAL		SWE'S USABLE		HCI's USABLE (Helton's coeff.)	
COMP	OUR RUN	PUMP	WW	1980	TM	DEPLETIONS	DEPLETIONS& ACCRETIONS	DEPLETIONS	DEPLETIONS& ACCRETIONS	DEPLETIONS	DEPLETIONS& ACCRETIONS
4	D3	H	H	C	H	25,892	22,233	16,484	12,897	10,981	8,342
	D4	H	C	C	H	MODIFIED HI MODEL					

Appendix Item 8

Excerpt From Def. Ex. 1012

Changes in Stateline Flow, ADMIN.FOR (Dec. 1991 version and Feb. 24, 1992 version of RIGHT.DAT) and Winter Consumptive Use Modification to HI Model (Sep. 1992)

CHANGES IN STATELINE FLOW

ADMIN.FOR (Dec. 1991 version and Feb. 24, 1992 version of RIGHT.DAT)
and Winter Consumptive Use Modification to HI Model (Sep. 1992)

		INSTITUTIONAL CONDITIONS				TOTAL		SWE'S USABLE		HCI's USABLE (Helton's coeff.)	
COMP	OUR RUN	PUMP	WW	1980	TM	DEPLETIONS	DEPLETIONS& ACCRETIONS	DEPLETIONS	DEPLETIONS& ACCRETIONS	DEPLETIONS	DEPLETIONS& ACCRETIONS
4	N26	H	H	C	H	25,532	-29,462	16,454	199	7,012	-31,986
	N27	H	C	C	H	MODIFIED HI MODEL TO ALLOW WINTER PET TO VARY WITH IRR. APPLICATION RATE					

Appendix Item 9

Excerpt from Jt. Ex. 3
The Record of Meetings of the Colorado-Kansas Arkansas River Compact Commission

Mr. Dixon [Director of Branch of Project Planning, U.S. Bureau of Reclamation]

•••••

My understanding in reading this, and the purpose of my question was—this says, "shall not be depleted in usable quantity or availability for use to the water users"—

Mr. Vidal [Commissioner for Colorado]

MR. VIDAL: Under this Compact.

MR. DIXON: Under this Compact, yes.

MR. VIDAL: We are trying to preserve a status quo.

MR. DIXON: I understand that. Of course, we are sympathetic to that objective.

•••••

Appendix Item 10

Excerpt from Jt. Ex. 4

Transcripts of Meetings of the Colorado-Kansas Arkansas River Compact Commission From the Files of General Kramer in the National Archives

[Pages 54-55]

*****

MR. VIDAL: ***** We are compacting about the present existing situation.

MR. KNAPP: That is right, we are compacting on the present condition. I am sure the Kansas Commissioners will want to be assured that the present conditions on the river will not be disturbed by the possibility of consumptive uses upstream.

*****

A-81

Appendix Item 11

Excerpt from Jt. Ex. 18-32

Annual Reports of the Arkansas River Compact Administration From 1949 Through December, 1964

BEST AVAILABLE COPY

[Pages 47-48]

APPENDIX "C-3"

Resolution

CONCERNING AN INVESTIGATION OF TRINIDAD RESERVOIR OPERATIONS

WHEREAS, it has come to the attention of the Arkansas River Compact Administration that 18,290 acre-feet of water stored under the Model Reservoir water right in Trinidad Reservoir during compact year 1979 was transferred to the joint use pool on September 28, 1979 by action of the Board of Directors of the Purgatoire River Water Conservancy District without objection from the Divis[i]on Engineer for Division 2, Colorado Division of Water Resources; and

WHEREAS, an additional 20,000 acre-feet was stored in Trinidad Reservoir under the Model Reservoir right during compact year 1980; and

WHEREAS, the State of Kansas has questioned whether these actions are in conformity with the operating principles for Trinidad Reservoir;

NOW, THEREFORE, BE IT RESOLVED that pursuant to Article VIII, paragraph H of the Arkansas River Compact, the Compact Administration shall cause an investigation to be made of these circumstances; and

BE IT FURTHER RESOLVED that this investigation shall be accomplished on behalf of the Compact Administration by the Colorado Water Conservation Board and the Kansas Division of Water Resources, which entities shall conduct said investigation as promptly as possible and report their determinations to the Compact Administration as soon as possible after the adoption of this resolution.

Entered this 30th day of June, 1980, at a special meeting of the Compact Administration held in Lamar, Colorado.

/s/ Frank G. Cooley, Chairman
Arkansas River Compact
Administration

/s/ Leo Idler, Secretary
Arkansas River Compact
Administration

APPENDIX "C-4"

Resolution

CONCERNING
TRINIDAD RESERVOIR

WHEREAS, the Arkansas River Compact Administration has made findings of fact relative to Trinidad Reservoir in Colorado, which findings were made at the special meeting of the Administration held in Lamar, Colorado, on September 25, 1980 (copy attached);

NOW THEREFORE, BE IT RESOLVED that the Administration goes on record as recognizing that the findings of fact made by the Administration have raised a question as to whether the waters of the Arkansas River have been materially depleted in usable quantity or availability for use to the water users in Colorado and Kansas; and

BE IT FURTHER RESOLVED that the Administration recommends that the Kansas State Engineer confer with the Colorado State Engineer to make further inquiries into this question as expeditiously as possible.

Entered this 25th day of September, 1980, at a special meeting of the Administration held in Lamar, Colorado.

/s/ Frank G. Cooley, Chairman
Arkans[s]as River Compact
Administration

/s/ Leo Idler, Secretary
Arkansas River Compact
Administration

Appendix Item 12

Excerpt from Jt. Ex. 19

Minutes of Meetings of the Arkansas River Compact Administration from 1949 Through December, 1984

MINUTES OF
ARKANSAS RIVER COMPACT ADMINISTRATION
SPECIAL MEETING

Court House
Lamar, Colorado
June 6, 1967

Attendance:

For Colorado:

Felix L. Sparks, Denver
Ernest Hofmeister, Lamar
George F. Reyher, McClave

For Kansas:

Robert V. Smrha, Topeka
Carl E. Bentrup, Deerfield
Logan N. Green, Garden City

For the United States:

Wilbur L. Heckler, Albuquerque, New Mexico

Others Attending:

G. D. Steward	Otero Co.	Rocky Ford, Colo.
Wayne Campbell	La Junta Chamber of Com.	La Junta, Colo.
Earl Beegles	Otero Co. Comm.	La Junta, Colo.
Everette Marshall	Catlin Ditch Board	La Junta, Colo.

Glenn G. Saunders	Purgatoire W.C. Dist.	Denver, Colo.
E. A. Thaxton	SECRA Chairman	Las Animas, Colo.
G. E. Kimble	Holbrook Lake Sptmns. Club	Swink, Colo.
Harry J. Figge	Colo. Game, Fish & Parks	Denver, Colo.
Robert A. Buchhagen	Corps of Engineers	John Martin Res.
Ross W. Moor	U.S.G.S.	Lamar, Colo.
Howard C. Corrigan	Div. of Water Res.	Garden City, Kans.
Leo J. Olson	C.F.I. Corp.	Pueblo, Colo.
Geo. T. O'Malley, Jr.	Colo. Game, Fish & Parks	Denver, Colo.
Bernie Bovee	Colo. Game, Fish & Parks	Colo. Spgs., Colo.
LeRoy Nickelson	Fort Bent	Lamar, Colo.
C. L. Nickelson	Fort Bent	Lamar, Colo.
Wm. Howland	Amity Mutual Canal	Holly, Colo.
Sisto Guidotti	Amity Mutual Canal	Bristol, Colo.
Carter Hutchinson	C.W.C.B.	Denver, Colo.
Harry C. Nevius	Amity Mutual Canal	Lamar, Colo.
W. T. Setchfield	Bent Co. Rec. Board	Las Animas, Colo.
James Donnelly	Chmn, Purgatoire W.C. Dist.	Trinidad, Colo.
Charles J. Cappellinni	Purgatoire W.C. Dist.	Trinidad, Colo.
Max Torres	Purgatoire W.C. Dist.	Trinidad, Colo.

J. L. Ogilvie	Bureau of Reclamation	Pueblo, Colo.
Ralph L. Strother	Corps of Engineers	Albuq., New Mexico
Leo J. Gamble	Bureau of Reclamation	Pueblo, Colo.
Edw. J. Tripp	U.S.G.S.	Denver, Colo.
Claire Behan	KLMR Radio	Lamar, Colo.
Donn Bynum	Tri-State Daily News	Lamar, Colo.
Clyde Albertson	Bent Co. Commissioners	Las Animas, Colo.
Frank Richards	Chamber of Commerce	Las Animas, Colo.
Dutch Schneider	Bowling Alley Owner	Las Animas, Colo.
Jack Robinson	City Council	Las Animas, Colo.
Fred L. Boydston	C.W.C.B.	Denver, Colo.
Francis M. Bell	C.W.C.B.	Denver, Colo.

MEETING CALLED TO ORDER

Chairman Heckler called the meeting to order at 9:55 A.M. He said that his first official duty was to present his credentials to the Administration. He next called for consideration of the minutes of the December 14, 1966 meeting. There being no corrections, the minutes were approved as submitted. The Chairman then read his report as follows:

REPORT

1. Appointment Credential—My appointment as federal representative to the Arkansas River Compact Administration was made by President Lyndon B. Johnson by letter of January 25, 1967. Copies of the appointment letter have been furnished to the commissioners of both States.

•••••

OLD AND NEW BUSINESS

Mr. Heckler then asked if there was any unfinished business. There being none, he passed on to new business and suggested consideration of the Trinidad Project as the first item.

Mr. Sparks was asked to present the Trinidad Project for consideration. He said the project had been before the Administration for a long time and he asked if Kansas had any further questions on the project.

Mr. Smrha said that the revised operating principles had not been submitted to the Administration as such.

Mr. Sparks then submitted the revised operating principles along with a letter written to the ditch companies in Kansas. He said this material had been previously submitted to the State of Kansas. After some discussion Mr. Sparks said that these were the same principles that were submitted originally to the Administration and in addition contained the five points requested by the State of Kansas.

Mr. Bentrup said there seemed to be some conflict in Article VI whether there should be a ten-year review or a five-year review and Mr. Ogilvie was called upon to explain it.

Mr. Ogilvie said the amendments specify a five-year review shall be made instead of a ten.

After some discussion Mr. Saunders said that the amendments to the document supersede the original document.

Mr. Sparks said that in all documents such as this, the amendments supersede the original document.

Mr. Smrha then asked Mr. Ogilvie if the operating principles as amended had been sent to the ditch companies and if there had been any response to these.

Mr. Ogilvie said there had been no response from the ditch companies.

Mr. Sparks then asked if Kansas wanted anything further done with respect to the operating principles.

Mr. Smrha replied that if the question of approval was submitted to the Administration then Kansas will act.

Mr. Sparks then moved and Mr. Hofmeister seconded a motion that the Administration approve the operating principles with the understanding that the amendments take precedent over the original operating principles as presented.

Mr. Green said that he thought that it would be less clumsy to redraw the principles and incorporate the amendments into a single document. He said that as of now there were two documents to approve. He suggested that if everything were incorporated into one document then everyone would know what it means.

Mr. Sparks then asked Mr. Ogilvie to explain the operating principles and amendments.

Mr. Ogilvie said the amendments do take precedent over the original item and that the items included make one document. Mr. Ogilvie further said that at the first review the operating principles would be revised and amended as deemed necessary.

Mr. Smrha then asked for a recess of five minutes to which Mr. Heckler agreed.

Mr. Heckler reconvened the recessed meeting and Mr. Green said that the Kansas delegates had caucused and thought that if the letter of March 20, 1967, from H. P. Dugan to the Governor of Kansas and countersigned by the Purgatoire Conservancy District was referred to in an amended motion then Kansas could act upon that.

Mr. Sparks said that he would like to withdraw his original motion and make a new motion, which he did as follows:

Moved that the document of March 20, 1967 submitted to Governor Docking and signed by H. P. Dugan and countersigned by Dr. Donnelly be approved by the Arkansas River Compact Administration. Mr. Green seconded the motion and after some discussion the motion was carried by vote of the states. The documents are attached as Appendix A.

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APPENDIX A

7-100

Hon. Robert Docking
Governor of Kansas
Topeka, Kansas

Dear Governor Docking:

On February 1, 1967, I concurred with views of the Kansas Water Resources Board and the State of Kansas relative to the Trinidad Project and the plan of operation as set forth in the "Operating Principles". At the same time, evidence of acceptance by the Purgatoire River Water Conservancy District of the five conditions set forth in Governor Avery's letter of December 30, 1966 was presented. Subsequent discussion with representatives of the Kansas Water Resources Board indicates the desirability of setting forth the "Operating Principles" and the five conditions clearly in one document so as to avoid any misunderstanding in the future as to their intent and purpose. I concur in this suggestion and, accordingly, quoted below are the "Operating Principles" as contained in the Irrigation Report on the Trinidad Project, Colorado, July 1964 (Revised September 1964) and the five conditions suggested in Governor Avery's letter of December 30, 1966:

OPERATING PRINCIPLES

TRINIDAD DAM AND RESERVOIR PROJECT

Preamble

The Trinidad Dam and Reservoir Project as reported in House Document No. 325, 84th Congress, 2d Session, and as authorized by the Flood Control Act of 1958, will be operated in such a manner as to secure the greatest practicable benefits from the

regulation and use of the flows of the Purgatoire River consistent with the laws and policies of the State of Colorado and of the United States including the Arkansas River Compact. The objectives and principles governing the operation of the Trinidad Dam and Reservoir Project to secure such benefits are contained within the following articles.

Article I - OBJECTIVES
Article II - DEFINITION OF TERMS
Article III- FLOOD CONTROL
Article IV - IRRIGATION
Article V - FISHERY AND RECREATION
Article VI - REVIEW AND AMENDMENT

Article I—OBJECTIVES

The operation of the Trinidad Dam and Reservoir involves the regulation of the flows of the Purgatoire River for flood control, irrigation use, and recreation including a permanent fishery pool. The project plan provides for:

1. Control of floods originating above the reservoir for benefit of the city of Trinidad and downstream reaches.
2. Optimum beneficial use of the available water for irrigation within the project area consistent with the protection of downstream non-project rights as set forth in House Document No. 325, 84th Congress, 2d Session, which provides:
   (a) Transfer of the storage decree of the Model Land and Irrigation Company for 20,000 acre-feet annually from the present site to the proposed Trinidad Reservoir.
   (b) Storage in the Trinidad Reservoir of flood flows originating on the Purgatoire River above the dam site which would otherwise spill from John Martin Reservoir.
   (c) Storage in Trinidad Reservoir of the winter flows of the Purgatoire River historically diverted for winter irrigation of project lands.
3. The maintenance of a minimum pool for enhancement of recreation and fishery values.

4. The construction of the Trinidad Dam and Reservoir with the following allocated capacities:

Flood control	51,000 acre-feet
Irrigation	20,000 acre-feet
Permanent fishery pool	4,500 acre-feet
Joint use*	39,000 acre-feet
Total capacity	114,500 acre-feet

* For irrigation and sediment accumulation

Article II—DEFINITION OF TERMS

Definition of terms as used herein:

1. "Reservoir" means the reservoir presently planned and authorized for construction on the Purgatoire River above the city of Trinidad, Colorado.
2. "District" means the Purgatoire River Water Conservancy District, that entity created and existing under laws of the State of Colorado to contract for repayment to the United States of an appropriate share of the project costs allocated to the irrigation use. The District shall also be the agency responsible for the regulation of irrigation water supplies within the District boundaries in the manner set forth therein.
3. "Unused Sediment Capacity" means that portion of the 39,000 acre-feet of reservoir capacity allocated to joint use but unoccupied by sediment at any given time.
4. "Irrigation Capacity" means the 20,000 acre-feet of reservoir capacity allocated to irrigation plus the unsedimented portion of the joint use capacity.
5. "Permanent Fishery Pool Capacity" means the 4,500 acre-feet of reservoir capacity allocated to fishery and recreation.
6. "Permanent Fishery Pool" means the quantity of water stored in the permanent fishery pool capacity.
7. "Flood Control" means the temporary storage of flood waters at any reservoir pool level as necessary to alleviate flood damages through the city of Trinidad and downstream reaches.

8. "Flood Control Capacity" means the 51,000 acre-feet of capacity exclusively allocated to flood control lying initially above m.s.l. reservoir elevation 6229.6.
9. "Reservoir Inflow" is to be expressed in mean daily cubic feet per second of time and means that total flow of water entering the reservoir, comprising measured flows at the inflow gaging stations and other unmeasured inflows entering the reservoir, less such flow of water as may be acquired by the State of Colorado for filling and maintaining the permanent fishery pool.
10. "District Irrigable Area" means only the 19,717 acres of Class 1, 2 and 3 irrigable lands to be served lying within District boundaries.
11. "Irrigation Season" means that period of the year, as determined annually by the District, during which water may be beneficially applied to the District irrigable area, provided the irrigation season will not begin earlier than April 1 or end later than October 15, except as modified by the District with the consent of the Secretary of Interior.
12. "Nonirrigation Season" means that period of the year other than the irrigation season.
13. "District Storage Right" means those rights under which the District may store water in the irrigation capacity for use on the District irrigable area.
14. "District Water Supply" means that water supply of the Purgatoire River subject to District administration for irrigation use within the District irrigable area.
15. "Colorado State Engineer" means the Colorado State Engineer or such other administrative agency having jurisdiction and control over the distribution of the waters of the State of Colorado.
16. "Operating Agency" means the U.S. army Engineer District, Albuquerque, New Mexico, Corps of Engineers.

Article III—FLOOD CONTROL

Trinidad Reservoir shall be operated for flood control benefits in accordance with regulations prescribed by the Secretary of the Army and the following operating principles:

1. All potentially damaging flood inflows shall be temporarily detained as necessary to limit the flow insofar as possible to a nondamaging flow,currently estimated to be 5,000 c.f.s., downstream from the Trinidad Reservoir.
2. All flood waters stored in the flood control capacity shall be released at the maximum nondamaging rate insofar as practicable.
3. Any inflow, other than that stored for irrigation use, temporarily retained below the bottom of the flood control capacity for flood control purposes, shall be released by the operating agency at such a rate, time, and quantity as may be ordered by the Colorado State Engineer, but within nondamaging flow in the channels below the reservoir.

Article IV—IRRIGATION

Administration of the irrigation capacity in Trinidad Reservoir and the distribution of water to the District irrigable area will be made by the District in accordance with House Document No. 325, 84th Congress, 2d Session, and these operating principles. Agreements, satisfactory to the Secretary of the Interior, shall be entered into between the District and the ditch companies and other owners of affected water rights to insure that these principles and the operation described herein shall be adopted.

The principles and provisions under which the District will administer water supplies to the District irrigable area are contained in the following four parts of this Article: "Water Rights", "Limits of Land and Water Use", "District Water Supply", and "Operation and Exercise of Water Rights".

A. Water Rights

Accomplishment of the following conditions is necessary under the laws of the State of Colorado to provide the District with

the right to regulate the flows of the Purgatoire River in the manner described herein:

1. The water users within the District shall assign the right to the exercise of all the decreed direct flow water rights within the District boundaries to the District for administration by the District at such times and to the degree outlined in these principles. The right to the exercise of the following water rights, all in water District No. 19, shall be so assigned.
2. Waters of the Purgatoire River shall be stored by the District in the irrigation capacity of Trinidad Reservoir under rights created under Colorado law; said rights, defined as the District storage right, include:
   (a) The Model storage right, being the right to store 20,000 acre-feet of water from the flows of the Purgatoire River, under reservoir priority No. 10 in Water District No. 19 at a rate of flow not exceeding 700 cubic feet per second of time under date of appropriation of January 22, 1908, as decreed by the District Court of Las Animas County, Colorado, on January 12, 1925, which right shall, by appropriate statutory proceedings be transferred from the place of storage as originally decreed to the site of the reservoir; and

(b) Such other rights to store water in the reservoir as the District may lawfully acquire by appropriation or purchase.

Priority		Amount	
Number	Date	(cfs)	Name of Ditch
3	11/30/61	6.00	Baca
5	3/20/62	4.00	Johns Flood
7	4/30/62	7.00	Chilili
8	11/15/62	2.82	Baca
8	11/15/62	1.18	El Moro
9	1/1/63	1.28	Johns Flood
9	1/1/63	4.72	Hoehne

12	6/30/63	0.50	South Side
13	1/1/64	1.25	Johns Flood
13	1/1/64	3.75	Lewelling & McCormick
15	4/10/64	5.10	Johns Flood
15	4/10/64	0.80	Hoehne
15	4/10/64	2.54	Salas
19	6/1/65	4.00	Lewelling & McCormick
20	10/7/65	7.35	Johns Flood
20	10/7/65	16.65	Hoehne
21	1/1/66	6.00	Burns & Duncan
22	2/1/66	4.00	Salas
27	5/31/66	2.25	Johns Flood
27	5/31/66	2.25	Salas
40	4/30/68	1.40	South Side
64	4/1/73	2.40	Johns Flood
73	11/1/75	6.00	South Side
74	2/17/76	34.00	South Side
75	12/25/76	4.00	South Side
77	3/11/77	1.30	El Moro
77	3/11/77	2.70	Baca
80	4/7/77	18.60	South Side
93	12/15/82	4.00	South Side
95	11/4/83	14.38	Baca
96	11/23/83	16.84	South Side
98	4/30/84	60.00	South Side
103	6/21/86	14.73	Baca
104	10/21/86	10.00	Lewelling & McCormick
106	3/12/87	15.00	Baca
108	2/15/88	9.70	South Side
109	3/1/88	8.00	South Side
137	11/23/97	2.00	V. Florez
145	10/20/02	100.00	Johns Flood
152	12/31/03	2.00	V. Florez
168	1/22/08	200.00	Model
242½	6/12/20	45.56	Baca

B. Limits of Land and Water Use

In order that the Trinidad Dam and Reservoir Project may provide an optimum beneficial use of water for irrigation within the District, the following limitations on land and water use shall apply:

1. The acreage irrigated by the District water supply shall be limited to the 19,717 acres classified as 1, 2 and 3 irrigable land lying within the District boundaries. These 19,717 acres of the District irrigable area shall be composed as nearly as practicable of the following acreages under individual ditches:

Baca	2,428	acres
Chilili	114	"
El Moro	160	"
Johns Flood	1,854	"
Model	6,177	"
South Side	6,359	"
Victor Florez	22	"
Hoehne	1,742	"
Burns & Duncan	322	"
Lewelling & McCormick	378	"
Salas	161	"
Total	19,717	acres

2. All water deliveries to the 19,717 acres of the District irrigable area will be limited during the irrigation season to the irrigation requirements at the farm headgate as determined by the District. Allowance for canal and lateral losses on the individual ditch systems will also be determined by the District.
3. No water deliveries for irrigation of the 19,717 acres of the District irrigable area will be made during the non-irrigation season.

C. District Water Supply

1. That water supply of the Purgatoire River subject to District administration for irrigation use within the District irrigable area, defined as the District water supply, consists of:
   (a) The water stored under the District storage right in the irrigation capacity.
   (b) The stream gains to the Purgatoire River below Trinidad Dam that are divertible to the District irrigable area for irrigation use through the District's exercise of the rights listed in IV.A.1.
   (c) That portion of the reservoir inflow bypassed to the river below Trinidad Dam which is subject to diversion to the District irrigable area through the District's exercise of the water rights listed in IV.A.1.
2. The District water supply will be allocated by the District to the ditches within the District to provide each acre of the District irrigable area an equitable share of the District water supply after allowance has been made for individual ditch transportation losses, provided such allocation will not exceed the irrigation requirements at the farm headgate.

D. Operation and Exercise of Water Rights

The principles governing operation of the irrigation capacity and the District's exercise of the assigned direct flow water rights listed under IV.A.1. and the District storage right are hereinafter set forth as they apply to operations during the entire year as well as to operations during either the non-irrigation season or irrigation season.

1. Non-interference with Downstream Water Rights
   (a) Bypasses to the river shall be made at any time during the year to satisfy downstream senior rights as ordered by the Colorado State Engineer to the extent that such demands are not met by stream gains or otherwise satisfied but are limited to the extent as determined by the Colorado State Engineer to actually

benefit such rights without unnecessary waste through channel losses.

(b) Reservoir inflow in excess of the amount stored under the transferred Model right may be detained in the reservoir at such times as John Martin Reservoir is reasonably expected to spill; to the extent that John Martin Reservoir would have spilled, such detained water shall be considered to have been stored under the District storage right and become part of the District water supply. Such detained water which does not become a part of the District water supply shall be released as called for by the Colorado State Engineer in the amounts and at such times as he shall determine that such releases may be required to avoid a material depletion of the water of the Arkansas River as defined in Article 3 of the Arkansas River Compact, C.R.S., 1953, 148-9-1.

(c) Except as provided by paragraph (b) above, any water temporarily detained in the reservoir as a result of the reservoir inflow exceeding the design outlet capacity of the reservoir shall be released as soon as possible.

(d) All releases from the reservoir, as set forth in (a), (b) and (c) above, shall be passed down the Purgatoire River without interference by water users in the District irrigable area.

2. District Operation, Non-Irrigation Season

(a) During the non-irrigation season the District will provide an allowance for stock watering purposes of not more than a daily mean flow of five second-feet or its volume equivalent measured at a gage to be located near and above the Baca River headgate. If the stream gains from the Trinidad Dam to the said gage are insufficient to fulfill the allowance, an equivalent volume of reservoir inflow will be released to satisfy stock water demands within the allowance.

(b) During the non-irrigation season the District will exercise the direct flow water rights and the District storage right only at such times and to the degree as necessary to assure:

(1) That the maximum possible storage of reservoir inflow is accrued.

(2) The stock water allowance is distributed in a manner determined equitable by the District.

3. District Operation—Irrigation Season

(a) During the irrigation season, except at such times as provided for in IV.D.3.(c) below, the District shall exercise the direct flow water rights and the District storage right only at such times and to the degree necessary to assure:

(1) That stream gains to the river below Trinidad Dam which are divertible to the District irrigable area and such reservoir inflow which is bypassed to the river for District irrigation use will be equitably distributed to the District irrigable area as part of the allocated District water supply.

(2) That the District storage right can be fully exercised to store reservoir inflow in excess of that bypass to the river as may be required under D.1.(a) and D.3.(a)(1) above.

(b) During the irrigation season water stored in the irrigation capacity will be released as needed to fulfill or partially fulfill the irrigation requirements of the District irrigable area as part of the allocated District water supply.

(c) During the irrigation season, when the irrigation capacity is empty as determined by the District, the District will relinquish its exercise of the direct flow water rights provided that if the reservoir inflow and stream gains below Trinidad Dam which are divertible to the District irrigable area exceed the irrigation requirement and such excess is storable under the District

storage right, the District will resume the exercise of the direct flow rights and exercise of the District storage right as in D.3.(a)(2) above.

4. Evaporation and Seepage Losses

In the accounting for water in storage, evaporation and seepage losses due to water stored in the irrigation capacity shall be determined using the most recent data available by the Colorado State Engineer and the District with the cooperation of the operating agency.

Article V—FISHERY AND RECREATION

The permanent fishery pool shall be operated in accordance with the following principles:

1. Water for the initial and subsequent fillings and for replacing evaporation and seepage losses will be acquired by the State of Colorado without interference to the District water supply or without additional cost to the District or the United States for the Trinidad Project as envisioned in House Document No.325.
2. In the accounting for water in storage, evaporation and seepage losses due to the permanent fishery pool shall be determined using the most recent data available by the Colorado State Engineer and the District with the cooperation of the operating agency.
3. There shall never be any release of water from the permanent fishery pool except upon the request of the Colorado Game, Fish, and Parks Commission to the Colorado State Engineer.

Article VI—REVIEW AND AMENDMENT

These operating principles may be subject to review and amendment not more than once a year at the request of any of the parties' signatory; provided, that at least one review shall be accomplished within the first 10 years following completion of the Trinidad Dam and at least one review be accomplished every 10 years thereafter. The primary object of such reviews

will be obtaining optimum beneficial use of water as conditions change, operating experience is gained, and more technical data become available.

FIVE CONDITIONS

State of Kansas

1. All inflows over established Colorado water rights (1156.05 cfs) be designated flood flows and released as promptly as downstream conditions permit. The only time water so designated may be stored in the conservation pool will be when John Martin Reservoir does not have the capacity to store additional water.

2. Any subsequent amendment of the operating principles should be subject to review and approval of the same interests as provided for in the original procedure.

3. Assurances that there will be no significant increase in water use which would result in a depletion of water yield to other Colorado and Kansas water users.

4. That 5 years after beginning operation of the Trinidad Reservoir for irrigation purposes, the operating principles be reviewed to determine the effect, if any, the operation has had on other Colorado and Kansas water users and the principles amended as necessary. Each 10 years thereafter reviews should be provided with amendments as needed.

5. All operating records be open for inspection by any qualified representative of the Arkansas River Compact Administration.

The Bureau of Reclamation concurs fully with the "Operating Principles" as set forth above and further agrees with the five conditions noted and suggested by the State of Kansas, also stated above.

To further assure acceptance and complete understanding of the "Operating Principles" and the five conditions, both set forth herein, and consistent with the resolution of the Purgatoire River Water Conservancy District, Dr. James E. Donnelly, President of the District, is joining the Bureau of Reclamation in this letter and so indicates by his signature, approving in its entirety the material set forth herein. Authority for Dr. Donnelly's approval is contained in a resolution passed by the Purgatoire River Water Conservancy District on January 26, 1967 and a copy of this resolution and Dr. James E. Donnelly's letter of January 26, 1967 is attached for your ready reference.

I am sure this adequately documents the intent and purpose of complying with the provisions set forth herein by the parties concerned and I would appreciate early advice from you of the State of Kansas' approval of this action.

Sincerely yours,

/s/ H.P. Dugan

H.P. Dugan
Director

PURGATOIRE RIVER WATER
CONSERVANCY DISTRICT
By: /s/ James E. Donnelly
James E. Donnely, President

Enclosures
cc:
Commissioner, Attention: 400 (with enclosures)
Project Manager, Pueblo, Colorado, Attention: P-100 (with enclosures)

Appendix Item 13

Excerpts from Jt. Ex. 23

Final Report by the U.S. Bureau of Reclamation on the Review of Operating Principles, Trinidad Project, Colorado (December 1988)

Table 4

TRINIDAD PROJECT
EFFECTS ON THE INFLOW TO JOHN MARTIN RESERVOIR
CAUSED BY THE TRANSFER OF WATER OUT OF
THE MODEL STORAGE RIGHT AND THE STORAGE
OF WINTER WATER UNDER THE
DIRECT FLOW RIGHTS—1979-1984.

CASE #/YR	•••••	•••••	NET EFFECT ON J.M. RES. INFLOW
•••••	•••••	•••••	•••••
CASE #3 (1HAD/79-84NS)			
1979			−4.0
1980			−9.0
1981			−1.5
1982	•••••	•••••	−5.4
1983			1.7
1984			6.6
TOTAL			−11.6
AVERAGE			−1.9

(Rev. 12/27/88)

[Page 26]

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From a standpoint of injury to downstream users, Case 1 gives the most reasonable results. However, none of the three studies gives a true picture of injury because they do not compare the actual condition to a "without project" condition. We investigated making the "without project" comparison and concluded that there was not sufficient information available to make meaningful comparisons.

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[Pages 28-29]

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The array of studies run on the 1925-57 period show the impacts of the practices of transferring water out of the Model Right and storing winter water under the direct flow rights. The studies also show the impacts of various levels of over irrigation, project operation with a 39,000 acre-foot joint-use pool (instead of the 19,500 acre-foot pool used in the 1961-64 studies) and several levels of bypass to Ninemile and Highland. The studies show the impacts of individual practices and conditions and various combinations of practices and conditions. A description of the various studies was displayed earlier in this section on pages 17 through 20, and the results are shown in Table 5 and Table 6. Tables 5 and 6 show that under most of the practices and conditions studied, the inflow to John Martin Reservoir is larger than that which would have occurred without the Project. The increase of inflow is smaller, however, than would occur if the Project were operated as assumed in the 1961-64 studies.

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[Page 55]

V. CONCLUSIONS

A. The transfer of water from the model storage right to the joint-use pool is a departure from the intent of the Operating Principles.

B. The storage of winter water under the direct flow rights is also a departure from the intent of the Operating Principles.

C. The transfer of water from the Model Right and the storage of winter water under the direct flow rights during the 1978-84 review period has depleted the usable inflow to John Martin Reservoir when compared to the inflow that would have occurred had the Trinidad Project been in accordance with the intent of the Operating Principles.

D. The transfer of water from the Model Right and the storage of winter water under the direct flow decrees, either singularly or collectively, will not cause the future usable inflow to John Martin Reservoir to be less with Trinidad Project in operation than it would have been without the Project. These practices will, however, result in less inflow to John Martin Reservoir than would occur if the water rights were administered in accordance with the intent of the Operating Principles.

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Appendix Item 14

Excerpt from Jt. Ex. 34
House Document No. 325, 84th Cong.
2d Sess. (1956)

House Document No. 325, 84th Cong. 2d. Sess. (1956)
[Pages 3-4]

*****

The district engineer presents as the most suitable plan one providing for a dam and reservoir on the main stem of Purgatoire River at mile 161. The total storage capacity would be 140,700 acre-feet, of which 46,700 is allotted to flood control, 55,000 to conservation, and 39,000 to sediment control. He has coordinated the irrigation aspects of the plan with the Bureau of Reclamation. To obtain maximum beneficial use of the irrigation storage the Bureau of Reclamation suggests five basic operating conditions as follows:

(a) Transfer of the storage decree of the Model Land & Irrigation Co., for 20,000 acre-feet annually, from the present site to the proposed Trinidad Reservoir.

(b) Storage in Trinidad Reservoir of flood flows originating on Purgatoire River above the dam site which would otherwise spill from John Martin Reservoir.

(c) Storage in Trinidad Reservoir of the winter flows of Purgatoire River historically diverted for winter irrigation of project lands.

(d) Regulation in Trinidad Reservoir of summer flows historically diverted to project lands provided that future streamflow records disclose such further regulation would not materially decrease depletions or that any material increase in depletions be compensated by suitable replacement to lands served by John Martin Reservoir.

(e) Storage in Trinidad Reservoir of all flood flows originating on Purgatoire River above the reservoir other than those specified in condition *(b)*, provided that suitable replacement is made to John Martin Reservoir to the extent that such storage in Trinidad Reservoir would result in material depletion of the inflow from

Purgatoire River into John Martin Reservoir and interfere with its operation as established by the Arkansas River compact. The district engineer states that operation of the irrigation capacity in accordance with conditions *(a)*, *(b)*, and *(c)* can be accomplished under existing Colorado law and the Arkansas River compact and will not significantly deplete the water supply presently available to water users downstream from the project area. He further states that the effects of the operation of the conservation capacity in accordance with conditions *(d)* and *(e)*, on the utilization of John Martin Reservoir for irrigation under the terms of Arkansas River compact are indeterminate from existing streamflow records.

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[Page 29]

97. Operation of the irrigation pool in the Trinidad Reservoir in accordance with the above conditions would require the complete cooperation of all water users in the project area, and the negotiation of suitable agreements and contracts to permit an equitable distribution of the project waters to the entire irrigated area in accordance with the crop requirements. Suitable arrangements may also have to be made with the water users served by the John Martin Reservoir under the terms of the Arkansas River compact if operation of the Trinidad project is to be accomplished under conditions *(d)* and *(e)* above.

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[Page 40]

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144. The chairman, and representative of the United States, Arkansas River Compact Administration, stated that additional supporting data would be needed to substantiate the conclusions

reached in the report before he deemed it advisable to submit specific comments and recommendations for official action by the administration.

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Appendix Item 15

Excerpt from Jt. Ex. 35

Flood Control Act of 1958, 72 Stat. 297

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Arkansas River Basin

The project for the Trinidad Dam on Purgatoire River, Colorado, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 325, Eighty-fourth Congress, at an estimated cost of $16,628,000.

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Appendix Item 16

Jt. Ex. 44

Letter dated February 1, 1967, from H.P. Dugan, Director, Region 7, U.S. Bureau of Reclamation, to Governor Robert Docking of Kansas

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
REGIONAL OFFICE, REGION 7
BUILDING 20, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

IN REPLY
REFER TO: 7-440

Hon. Robert Docking
Governor of Kansas
Topeka, Kansas

FEB 1- 1967

Dear Governor Docking:

This is in reply to former Governor Avery's letter of December 30, 1966, to us concerning the operation of the proposed Trinidad Reservoir Project on the Purgatoire River near Trinidad, Colorado.

We are pleased to learn that the Kansas Water Resources Board, on the basis of our report on the irrigation function of the proposed Trinidad Project and additional information furnished by our representatives, has concluded essentially that the proposed Trinidad Project will not materially deplete the water supply of the Purgatoire River and John Martin Reservoir providing the project is operated in strict conformity with the guidelines used in the Trinidad Project investigations and the "Operating Principles" contained in the Bureau's Trinidad Irrigation Report.

We wish to assure you that the Bureau of Reclamation in its planning investigations for the proposed Trinidad Project and in developing the "Operating Principles" therefor has been fully aware of and has diligently and conscientiously endeavored to imple-

ment the provisions of the Arkansas River Compact so that the interests of the State of Kansas at all times will be fully protected consistent with the provisions of the Arkansas River Compact.

We appreciate the concern of the State of Kansas with the possibility that the Trinidad Project in its actual operation might have an adverse effect on Kansas and that provision should be made for timely adjustment of Trinidad Project operations to promptly eliminate any such adverse effects, should they occur. This legitimate concern is reflected in the five conditions set forth in former Governor Avery's letter with regard to future review and amendment, if necessary, of the "Operating Principles."

We have discussed this matter with the Board of Directors of the Purgatoire River Water Conservancy District. The Board is unanimous in its resolve that the five conditions in Governor Avery's letter are consistent with the Board's understanding of the "Operating Principles" and the manner of operation of the project as contemplated by the Board, and, further, that the Board approves those conditions to become operable when approved by the Regional Director, Bureau of Reclamation. A certified copy of the Board's January 27, 1967 resolution to that effect and a copy of District President James E. Donnelly's letter to us on this matter are enclosed.

The Bureau of Reclamation concurs fully in the enclosed resolution of the Board of Directors of the Purgatoire River Water Conservancy District and will be governed accordingly in implementing the "Operating Principles."

It would be greatly appreciated if your approval of the Trinidad Project can be received at an early date.

Sincerely yours,

H. P. Dugan
Director

Enclosures 2

Appendix Item 17

Jt. Ex. 45

Letter dated April 11, 1967, from Governor Robert Docking of Kansas to H.P. Dugan, Director, Region 7, U.S. Bureau of Reclamation

A-91

STATE OF KANSAS

OFFICE OF THE GOVERNOR

STATE CAPITOL BUILDING
TOPEKA, KANSAS

ROBERT B. DOCKING
GOVERNOR

April 11, 1967

Mr. H. P. Dugan
Bureau of Reclamation
Regional Office — Region 7
Building 46 — Federal Center
Denver, Colorado

Dear Mr. Dugan:

This will acknowledge receipt of your letters of February 1, 1967, and of March 20, 1967, and the Resolution from the Purgatoire River Water Conservancy District, Colorado.

I appreciate the consideration given by the Bureau of Reclamation and the Purgatoire River Water Conservancy District to the concern of the State of Kansas that the operation of the proposed Trinidad Project not adversely affect the volume of water flowing into John Martin Reservoir.

The resolution of the Purgatoire River Conservancy District dated January 26, 1967, together with the statement of the amended operating principles as contained in your letter of March 20, 1967, have been reviewed and found acceptable.

I, therefore, signify my approval of the amended operating principles referred to above, and offer no objection to the Trinidad Project being completed subject to the acceptance of the amended principles by the Arkansas River Compact Administration.

Sincerely,

Robert B. Docking
Governor

RBD:bj

cc: Mr. R. V. Smrha
Mr. Carl E. Bentrup
Mr. Logan N. Green
Mr. Felix L. Sparks
Mr. George F. Reyher
Mr. Ernest Hofmeister
Mr. Wilbur L. Heckler
Kansas Water Resources Board

Appendix Item 18

Excerpt from Jt. Ex. 99

U.S. Army Corps of Engineers, 1978, revised 1985, Water Control Manual, Trinidad Lake

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1-06. Regulating agencies. The operating principles for Trinidad Dam and Reservoir have been mutually agreed upon by the Corps of Engineers, Bureau of Reclamation, State of Colorado, Arkansas River Compact Administration, and the Purgatoire River Water Conservancy District. The project will be operated in such a manner as to secure the greatest practicable benefits from flood control, irrigation and recreation.

Appendix Item 19

Excerpt from R. vol. 15

October 18, 1990

(Direct Examination of Brent Spronk)

[Pages 132-34]

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SPECIAL MASTER: MR. SPRONK, I TAKE IT THAT THE EFFORT TO INTEGRATE WELLS INTO THE SURFACE WATER SYSTEM COULDN'T BE DONE ON AN ABSOLUTE PRIORITY KIND OF BASIS, COULD IT? IT WAS NOT DONE THAT WAY? WHAT IS GOING THROUGH MY MIND IS, WE LOOKED AT EXHIBITS EARLIER THAT INDICATED THAT IF YOU DIDN'T HAVE A PRIORITY BY 1890 OR SO, YOU WOULD BE OUT OF LUCK A GREAT DEAL OF THE TIME. OBVIOUSLY, ALL OF THE WELLS ARE GOING TO HAVE A MUCH LATER PRIORITY IF YOU ENFORCE THAT SYSTEM STRICTLY.

THE WITNESS: THAT'S A DILEMMA THAT COLORADO FOUND ITSELF IN, YOUR HONOR, TRYING TO FIT A SQUARE PEG IN A ROUND HOLE.

SPECIAL MASTER: WITHOUT GETTING INTO ANY LEGAL INTERPRETATIONS, WHAT DOES THE STATE ENGINEER DO, WHAT EXACTLY?

THE WITNESS: THE STATE ENGINEER ATTEMPTED TO ENACT RULES AND REGULATIONS AND ATTEMPTED TO, OVER TIME, CURTAIL OR REGULATE THE USAGE OF WELLS, THE THEN EXISTING WELLS, SO AS TO CURTAIL THEIR PUMPING AND CUT IT OFF OVER A PERIOD OF TIME. HE ULTIMATELY WAS NOT SUCCESSFUL IN WHOLE, BUT IN PART, IN THAT REGARD IN TERMS OF CURTAILING WELLS. THERE IS SOME EXCEPTIONS TO ALL OF WHAT I'M SAYING, HOWEVER, THOUGH, BEAR IN MIND.

SPECIAL MASTER: HE DID WHAT I WAS SUGGESTING, THAT THERE HAD TO BE SOME MODIFIED APPROACH TO THIS OR IT SEEMED TO ME THAT COLORADO'S PRODUCTION WOULD HAVE BASICALLY BEEN HALTED.

THE WITNESS: THERE WERE ATTEMPTS BY THE STATE ENGINEER TO ENACT, AS IS SAID, RULES AND REGULATIONS. THE ULTIMATE BOTTOM LINE, HOWEVER, YOUR HONOR, IS THAT THE WELLS CONTINUE — THAT WERE IN EXISTENCE CONTINUE TO OPERATE MORE OR LESS AS THEY DID BEFORE WITH VERY LITTLE, IF ANY, ACTUAL REPLACEMENT PROVIDED TO MAKE UP THE DEPLETIONS THAT WERE OCCURRING EVEN AS OF 1969 OR TODAY.

SPECIAL MASTER: NOW, THAT'S YOUR OPINION AS TO HOW WELLS ARE OPERATING TODAY.

THE WITNESS: THAT'S CORRECT, YOUR HONOR.

SPECIAL MASTER: SO YOUR OPINION IS THAT THEY'RE OPERATING BY AND LARGE WITHOUT LIMITATION —

THE WITNESS: THERE ARE SOME RULES AND REGULATIONS, BUT THEY OPERATE BY — BUT EFFECTIVELY THE IMPLEMENTATION OF THOSE RULES AND REGULATIONS ALONG WITH THE WRITTEN PLANS THAT THERE ARE EXCEPTIONS TO THE RULES AND REGULATIONS TO ALLOW THE WELLS TO BASICALLY OPERATE AS THEY WERE BEFORE THE 1969 ACT WITH AN EXCEPTION OF A SMALL AMOUNT OF REPLACEMENT WATER THAT THEY HAVE PROVIDED TO THE STREAM IN TERMS OF TRANSMOUNTAIN RETURN FLOWS.

SPECIAL MASTER: ALL RIGHT.

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Appendix Item 20

Excerpts from R. vol. 18

October 23, 1990

(Direct Examination of Brent Spronk)

[Pages 9-10]

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AFTER REVIEWING THE DOCUMENTS REGARDING THE BACKGROUND AND DEVELOPMENT OF THE TRINIDAD PROJECT, IT WAS CONCLUDED THAT THE CURRENT AND PAST OPERATION OF THE PROJECT IS NOT IN ACCORDANCE WITH THE OPERATING PRINCIPLES OF THE TRINIDAD DAM AND RESERVOIR PROJECT. THERE ARE TWO SIGNIFICANT DEVIATIONS FROM THE OPERATION OF THE PROJECT AS ORIGINALLY CONTEMPLATED BY THE BUREAU OF RECLAMATION WHO ARE THE AUTHORS OF THE OPERATING PRINCIPLES. THESE ARE 1, THE FACT OF TRANSFERS OR ROLLING OF THE CONTENTS OF THE IRRIGATION POOL INTO THE JOINT-USE POOL AND THEREBY ALLOWING AT TIMES MORE THAN 20,000 ACRE FEET TO BE STORED IN TRINIDAD RESERVOIR UNDER THE TRANSFERRED MODEL RIGHT.

"2, NOT COUNTING FOR THE STORAGE OF WINTER FLOW AS A PART OF THE 20,000 ACRE FEET OF STORAGE ALLOWED BY THE TRANSFERRED MODEL RIGHT.

"IN ESSENCE, IN 1984, I CONCLUDED, BASED ON MY INDEPENDENT REVIEW, THAT THOSE TWO PRACTICES WERE NOT IN ACCORDANCE WITH THE OPERATING PRINCIPLES. FOUR YEARS LATER IN THE BUREAU REPORT, THE SAME CONCLUSIONS ARE SET FORTH ON PAGE 55, UNDER ITEMS A AND B ON PAGE 55."

SPECIAL MASTER: MR. SPRONK, IN THAT PARAGRAPH 4.1.5, YOU ARE SAYING THAT THERE ARE TWO SIGNIFICANT DEVIATIONS, AND THEN YOU GO ON TO EXPLAIN THE ROLLOVER PROCEDURE WITH STORAGE OF WINTER FLOWS.

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[Pages 16-17]

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THE WITNESS: THE ADJUSTMENT OR THIS ADJUSTMENT FOR CONSERVATION POOL STORAGE RESULTS IN THE AMOUNT OF WATER WHICH WAS DEPLETED FROM THE CONSERVATION POOL STORAGE, 40 PERCENT OF WHICH WOULD BE ASSOCIATED WITH KANSAS ENTITLEMENT — OR UP TO 40 PERCENT WOULD BE ASSOCIATED WITH KANSAS ENTITLEMENT OF WATER FROM THE CONSERVATION POOL STORAGE.

WHAT I HAVE DONE IN THIS ILLUSTRATION IS TO TAKE THE MONTHLY ANALYSIS THAT I PERFORMED, SUMMARIZE IT IN AN ANNUAL BASIS AS THE BUREAU DID IN THEIR TABLE 4 ON PAGE 16 OF JOINT EXHIBIT 23 SO THAT THESE NUMBERS FOR BOTH CASES 1 AND 2 UNDER THE COLUMNS DEPLETION THROUGH THE CONSERVATION POOL STORAGE DEPICT —

MR. DRAPER: IS THAT CASES 1 AND 2?

THE WITNESS: 1 AND 3. I'M SORRY.

— DEPICT THE QUANTITIES OF WATER DEPLETED FROM THE CONSERVATION POOL STORAGE — TO THE CONSERVATION POOL STORAGE AS A RESULT OF A DEPARTURE FROM THE OPERATING PRINCIPLES AT TRINIDAD RESERVOIR.

SPECIAL MASTER: BASED ON THE CONDITIONS THAT YOU HAVE JUST DESCRIBED?

THE WITNESS: THAT IS CORRECT.

•••••

THIRDLY, COLORADO HAS NOT EFFECTIVELY ADMINISTERED THE WATERS OF THE ARKANSAS RIVER TO PROTECT SURFACE WATER USERS, INCLUDING THE STATE OF KANSAS FROM THE USE OF GROUND WATER WITHIN THE ARKANSAS BASIN.

THE HISTORY OF WELL ADMINISTRATION OR LACK THEREOF IS BORNE OUT BY NO ATTEMPTS TO ADMINISTER GROUND WATER USAGE BEFORE 1965 AND AFTER THE 1965 GROUND WATER ACT, WHICH IS COLORADO EXHIBIT 378. THE ATTEMPT TO SHUT DOWN SOME WELLS RESULTED IN FAILURE BECAUSE THE ACTIONS WERE NOT PROPERLY UNDERTAKEN. I REFER THE COURT TO THE *FELLHAUER* CASE, WHICH IS COLORADO EXHIBIT 384.

THE CURRENT RULES AND REGULATIONS — IN OTHER WORDS, THE 1973 RULES AND REGULATIONS — THAT ARE IN EFFECT IN THE ARKANSAS BASIN ARE BASICALLY INEFFECTIVE IN CONTROLLING THE USE AND PUMPAGE BY EXISTING WELLS RESULTING IN NO REDUCTIONS IN PUMPING, AND THEY DO NOT PROVIDE AN ADEQUATE MEANS TO FULLY REPLACE THE STREAM DEPLETIONS CAUSED BY THESE WELLS, SPECIFICALLY THE WRITTEN PLANS THAT HAVE BEEN APPROVED AND USED BY EITHER THE — BY COLORADO OR THE LOWER ARKANSAS WATER MANAGEMENT ASSOCIATION AND THE COLORADO WATER PROTECTIVE AND DEVELOPMENT ASSOCIATION ARE INEFFECTIVE IN REPLACING ALL STREAM DEPLETIONS.

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Appendix Item 21

Excerpts from R. vol. 53

February 13, 1991

(Cross-examination of Timothy Durbin)

[Pages 143-146]

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Q. NOW, LOOKING AT THE MONTHS OF DECEMBER, 1950 THROUGH MARCH, 1951, THE HYDROLOGIC-INSTITUTIONAL MODEL CALCULATES NET DEPLETIONS OF STATE LINE FLOWS; IS THAT CORRECT?
A. WHICH PERIOD ARE WE LOOKING AT NOW?
Q. DECEMBER, 1950 THROUGH MARCH, 1951.
A. DECEMBER, 1950 —
Q. WHICH IS COMPACT YEAR 1951. SO IT IS DECEMBER — SO WE ARE TALKING ABOUT DECEMBER WHICH IS THE NEXT MONTH. IT IS UNDER COMPACT YEAR 1951, DECEMBER, '51, WHICH IS ACTUALLY DECEMBER, 1950.
A. OKAY.
Q. THROUGH MARCH OF 1951. THE HYDROLOGIC-INSTITUTIONAL MODEL IN EACH OF THOSE MONTHS, THE NEXT FOUR MONTHS, CALCULATES A NET DEPLETION OF STATE LINE FLOWS; IS THAT RIGHT?
A. THAT'S CORRECT.
Q. IN COMPARISON F.

THE MODEL ALSO CALCULATES DEPLETIONS OF USABLE STATE LINE FLOWS IN THOSE MONTHS AS WELL; IS THAT CORRECT?

A. YES.
Q. NOW LOOKING BACK AT TABLE 7A OF PLAINTIFF'S EXHIBIT 327, WHICH WAS THE SPRONK WATER ENGINEER'S MEMO, DOES IT MAKE SENSE TO YOU THAT WELL PUMPING IN COLORADO DEPLETED USABLE STATE LINE FLOW DURING THE PERIOD NOVEMBER, 1950 THROUGH MARCH, 1951, WHEN THE KANSAS DIVERSIONS DURING THAT PERIOD WERE ONLY 22 PERCENT OF THE STATE LINE

FLOWS AND THE UNUSED FLOW AT GARDEN CITY EXCEEDED THE FLOW AT THE STATE LINE?

A. YES, IT DOES.

Q. TO DETERMINE — WHY DOES THAT MAKE SENSE TO YOU?

SPECIAL MASTER: YOU ARE GOING TO ASK THAT DANGEROUS QUESTION?

MR. ROBBINS: YES, SIR.

THE WITNESS: IT MAKES SENSE TO ME, BECAUSE A CHANGE IN STATE LINE FLOWS RESULTS IN A CHANGE IN DIVERSIONS AND IT ALSO RESULTS IN A CHANGE IN GROUND WATER RECHARGE. AND THOSE TWO THINGS TOGETHER CONSTITUTE WHAT IS A CHANGE IN USABLE FLOW.

BY MR. ROBBINS:

Q. BUT LOOKING AT THE DIVERSIONS IN 1951 DURING THAT TIME, THEY ONLY DIVERTED 22 PERCENT OF THE WATER, DIDN'T THEY?

A. IF THE DATA IN 7A APPROPRIATELY REPRESENTS WHAT ACTUALLY OCCURRED.

Q. DO YOU HAVE ANY REASON TO DOUBT THAT THE DATA SHOWN IN 7A ARE ACCURATE?

A. NO.

Q. SO IN 1951, DURING THAT PERIOD THEY ONLY TOOK 22 PERCENT OF THE FLOW; RIGHT?

A. RIGHT. BUT IF THERE WAS MORE, THEY WOULD HAVE DIVERTED MORE. THAT IS THE UNDERLYING BASIS OF THE USABLE FLOW CALCULATIONS.

Q. WELL, NOW THERE WAS 52,000 ACRE FEET AT THE STATE LINE AND THE DIVERSIONS WERE 11,000, WHAT MAKES YOU SAY THAT IF THERE WAS MORE THEY WOULD HAVE TAKEN MORE? THERE WAS AT LEAST 40,000 MORE THERE AS IT WAS THAT THEY DIDN'T TAKE.

A. BECAUSE THEIR AVERAGE BEHAVIOR IS THAT REGARDLESS OF WHAT THEY'RE ACTUALLY DIVERT-

ING AND WHAT IS AVAILABLE THAT IF MORE FLOW IS AVAILABLE, THEY WILL TEND TO DIVERT MORE.

Q. SO —

SPECIAL MASTER: MR. DURBIN, LOOKING AT PLAINTIFF'S EXHIBIT 327, TABLE 7A, THIS IS A TABLE PREPARED FROM ACTUAL MEASUREMENTS, IT HAS NOTHING TO DO WITH THE MODEL?

THE WITNESS: IT HAS NOTHING TO DO WITH THE MODEL. THESE ARE ACTUAL DATA.

SPECIAL MASTER: SO YOU HAVE BEEN LOOKING AT THE YEAR 1950, '51. YOU CAN LOOK AT A NUMBER OF YEARS WHERE PERCENTAGE OF DIVERSION OF STATE LINE FLOWS IS FAIRLY LOW. WHY DOES THAT OCCUR? THEY WANT TO HAVE AS MUCH CANAL WATER OR RIVER WATER AS THEY CAN GET. WHY WOULD IT BE, PERCENTAGE FIGURES THAT ARE DOWN TO 18 PERCENT, 7 PERCENT, 17 PERCENT, 5 PERCENT AND SO ON?

THE WITNESS: BUT ON THE AVERAGE —

SPECIAL MASTER: I GUESS I'M LOOKING AT WINTER. I SHOULDN'T BE DOING THAT.

THE WITNESS: I THINK THAT'S WHAT MR. ROBBINS HAS US EXAMINING NOW IS THE WINTERTIME.

SPECIAL MASTER: OKAY. I UNDERSTAND IF IT IS WINTER, IT WOULD MAKE A DIFFERENCE. I WAS THINKING THAT WAS A YEARLY PERCENTAGE.

BY MR. ROBBINS:

Q. I'M STILL UNCLEAR. FOR EXAMPLE, IN A YEAR LIKE 1960, WHEN THERE IS APPROXIMATELY 60,000 ACRE FEET AT THE STATE LINE AND KANSAS ONLY TOOK 4,000 ACRE FEET, WHY IF THERE WERE MORE WATER KANSAS WOULD TAKE MORE. THEY PASSED, YOU KNOW, 55,000 ACRE FEET.

A. I THINK THAT IT'S EASIER TO SEE THIS IF WE EXAMINE, FIRST OF ALL, THE SUMMERTIME.

Q. WE CAN LOOK AT THE SUMMER IN TIME. BUT I WANT TO UNDERSTAND IN THE WINTER. YOU SAID THAT UNDER NO CIRCUMSTANCES WOULD A DEPLETION IN STATE LINE FLOWS NOT RESULT IN INJURY TO THE KANSAS WATER USERS, AND I'M INTERESTED, BECAUSE YOU SAY THAT IF THERE IS MORE WATER THEY DIVERT MORE.

A. THAT IS CORRECT.

Q. I'M CURIOUS WHY, FOR EXAMPLE, IN 1960, THERE IS 60,000 ROUND NUMBERS ACRE FEET AT THE STATE LINE, THEY TOOK JUST A LITTLE OVER 4,000, THERE IS 70,000 PASSING GARDEN CITY, AND YOU SAY THAT THERE IS NO WATER THAT COULD BE DEPLETED AT THE STATE LINE WITHOUT DEPRIVING KANSAS WATERS USERS OF USABLE FLOWS?

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[Pages 148-149]

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SPECIAL MASTER: MR. DURBIN, LET'S STEP AWAY FOR A MINUTE FROM THE REGRESSION TABLES AND SORT OF ADDRESS MR. ROBBINS'S POINT IN MORE GENERAL TERMS. HE'S SUGGESTING THAT ANY GIVEN YEAR — AND HE'S USING 1950, '51 AS AN EXAMPLE, BUT I THINK YOU COULD FIND SOME OTHER YEARS THAT WOULD BE SIMILAR — IN ANY GIVEN YEAR, KANSAS IS NOT — JUST STAY WITH THE WINTER FOR JUST A SECOND — KANSAS IN THE WINTERTIME IS NOT DIVERTING BUT SOME FRACTION OF WATER THAT IS AVAILABLE AT THE STATE LINE. AND ASSUMING THAT WE ARE NOT HITTING ONE OF THESE CAPS SO THAT IT BECOMES UNUSABLE, AND THESE CHARTS ALSO INDICATE THAT IN SOME OF THESE SAME YEARS THAT WE ARE LOOKING AT THERE IS ALSO WATER PASSING

GARDEN CITY, HE'S SAYING THAT AT LEAST IN THOSE WINTER MONTHS SHOULDN'T COLORADO PEOPLE BE ABLE TO TAKE MORE WATER — IT SAYS PUMPING, I PRESUME IT COULD BE TAKEN IT ANYWAY — WITHOUT INJURY, THE IDEA BEING THAT IF YOU REDUCE THE STATE LINE FLOWS, IT STILL ISN'T GOING TO MAKE ANY DIFFERENCE, BECAUSE KANSAS ISN'T TAKING ALL OF THE STATE LINE FLOWS THAT ARE THERE. NOW, I THINK IN GENERAL THAT IS THE POINT THAT HE'S TRYING TO MAKE.

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Appendix Item 22

Excerpt from R. vol. 54

February 14, 1991

(Direct Examination of Jeffrey Lefkoff)

BEST AVAILABLE COPY

[Pages 122-23]

.....

BY MR. DRAPER:

Q. ARE YOU ABLE TO CATCH — IN THE ADMINISTRATIVE MODULE DAILY TIME STEP, DOES THAT ALLOW YOU TO CAPTURE THE DAILY FLUCTUATIONS IN THE STREAMFLOW?

A. YES. THAT IS THE REASON FOR USING A DAILY TIME STEP IN THE ADMINISTRATIVE MODULE. THERE ARE SOMETIMES SIGNIFICANT DAY-TO-DAY FLUCTUATIONS IN STREAMFLOW. AND THAT OBVIOUSLY IS THE WAY THEY CALL AND SO BY BASING THE ADMINISTRATIVE MODULE ON A DAILY TIME STEP, THE MODEL IS ABLE TO CAPTURE THOSE INTRAMONTH FLUCTUATIONS, BOTH IN STREAMFLOW AND IN DIVERSIONS THAT WOULD OCCUR.

Q. AND DOES THAT ALSO APPLY TO RESERVOIR RELEASES?

A. YES.

Q. ARE THEY DONE ON A DAILY BASIS, ALSO?

A. YES, THAT IS RIGHT.

.....

[Page 125]

.....

A. . . . .

DAILY STREAMFLOW, WHICH I DISCUSSED A MOMENT AGO, IS ALSO READ IN. THAT IS DAILY STREAMFLOW AT — ON THE MAIN STEM OF THE ARKANSAS RIVER AT PUEBLO, AND ON THE PURGATOIRE AT LAS ANIMAS.

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Appendix Item 23

Excerpt from R. vol. 82

May 22, 1991

(Direct Examination of Duane Helton)

[Page 139]

.....

BY MR. ROBBINS:

Q. MR. HELTON, WHY IS THE PRE-COMPACT PUMPING FOR THE YEARS '40 TO '49 LESS IN SOME INSTANCES THAN THE PUMPING ATTRIBUTABLE TO THE PRE-COMPACT WELLS AFTER 1950?

A. BECAUSE OF THE SURFACE WATER SUPPLY THAT WAS AVAILABLE, YOUR HONOR.

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Appendix Item 24

Excerpt from R. vol. 89

February 25, 1992

(Direct Examination of Brent Spronk)

[Pages 40-50]

*****

BY MR. DRAPER:

Q. MR. SPRONK, WOULD YOU DESCRIBE THE CRITERIA WHICH YOU EMPLOYED IN DETERMINING USABLE STATE LINE FLOWS?

A. THE CONSIDERATIONS I GAVE WERE SEVERAL FOLD. ONE OF THE THINGS THAT I LOOKED AT IS WHETHER OR NOT THE — WHAT AMOUNTS WERE BEING REQUESTED FOR DELIVERY BY KANSAS OF STORED WATER IN JOHN MARTIN WAS MORE OR LESS THAN WHAT WAS ACTUALLY BEING DELIVERED TO THE STATE LINE.

ANOTHER THING THAT I LOOKED AT WAS WHETHER THE STREAMFLOWS BETWEEN THE STATE LINE AND GARDEN CITY WERE AFFECTED BY RAINFALL EVENTS, MAJOR RAINFALL EVENTS. AND THAT WAS INDICATED BY THE DAILY PRECIPITATION RECORDS THAT I UTILIZED—HAD AVAILABLE TO ME. I BASICALLY LOOKED AT JUST EVENTS THAT WERE IN TERMS OF THE AMOUNT OF WATER ON A DAILY BASIS OF RAINFALL, THAT IS ONE INCH PER DAY. I LOOKED AT THOSE LARGE RAINFALL EVENTS AND OBSERVED THE CHANGES IN FLOW AND WHAT CHANGES IN FLOW EXISTED AS A RESULT.

I ALSO CONSIDERED WHETHER OR NOT THE FRONTIER DITCH, WHICH IS THE UPPERMOST DITCH, MOST UPSTREAM DITCH OF THE KANSAS DITCHES, WHETHER IT DIVERTED ALL OR ESSENTIALLY ALL OF THE FLOW AVAILABLE AT THE STATE LINE. AND THERE ARE A FEW OCCASIONS IN THE DRY YEARS WHERE ESSENTIALLY ALL OF THE FLOWS WERE BEING DIVERTED BY THE

FRONTIER DITCH. THAT, FOR INSTANCE, WOULD INDICATE THAT OBVIOUSLY MORE WATER COULD BE USED BY THE OTHER DITCHES.

THE OTHER CONSIDERATIONS WERE WHETHER THE — WHAT I HAVE REFERRED TO AS THE UPPER GARDEN CITY DITCHES, WHETHER THEIR DIVERSIONS ARE MADE UP OR ESSENTIALLY TOOK ALL OF THE RIVER FLOW AS WAS RECORDED AT SYRACUSE. THE UPPER DITCHES, AS THE WAY I HAVE COMBINED THEM, CONSIST OF THE AMAZON DITCH, THE GREAT EASTERN DITCH, AND THE SOUTHSIDE DITCH. AS YOU CAN SEE FROM KANSAS EXHIBIT 20, THOSE ARE THE LOWER THREE—EXCUSE—THOSE ARE THE MIDDLE THREE DITCHES. THERE IS STILL ONE DITCH BELOW THAT, ONE HEAD GATE BELOW THAT, FARMERS DITCH AND GARDEN CITY DITCH. THEY ACTUALLY NOW DIVERT AT A COMMON HEAD GATE. THE UPPER GARDEN CITY DITCHES, THE WAY I DEFINED THEM ARE THE AMAZON DITCH AND THE GREAT EASTERN DITCH, AND THE SOUTHSIDE DITCH.

AND I TOTALLED THOSE DAILY DIVERSIONS AGAIN ON A DAILY BASIS AND COMPARED THOSE WITH THE FLOWS AVAILABLE AT SYRACUSE. AND IF THE ACCUMULATED DIVERSIONS WERE SIGNIFICANTLY GREATER THAN THE FLOW AT SYRACUSE, THEN I CONSIDERED THAT WAS PROBABLY A DAY THEY WERE USING ALL OF THE WATER THAT WAS AVAILABLE TO THEM.

FINALLY—EXCUSE ME, THERE ARE TWO MORE CRITERIA.

YOU WILL RECALL THAT THERE WERE—THAT I MENTIONED EARLIER THERE WERE STREAMFLOW RECORDS ON A DAILY BASIS FOR SOME OF THE INTERVENING DITCHES BETWEEN THE STATE LINE AND GARDEN CITY. THE SYRACUSE GAUGE, FOR IN-

STANCE, THERE WAS A CONTINUOUS RECORD OVER THE WHOLE PERIOD. AT THE OTHER DITCHES, THERE ARE VARYING RECORDS. MOST OF THEM HAVE RECORDS DURING THE LATE '70'S AND EARLY '80'S. THE DAILY AMOUNTS OF FLOW RECORDED AT THOSE GAUGES WERE ALSO UTILIZED FOR THEIR PERIOD OF RECORD. THOSE GAUGES INDICATE THAT THE FLOWS AT TIMES ESSENTIALLY WERE ZERO THERE, ALSO, WERE VERY LOW AT POINTS. AND WHEN THE RIVER DRIED UP AT ONE OF THESE POINTS, IT WAS AN INDICATOR TO ME THAT THEN ALL OF THE WATER THAT WAS THEN AVAILABLE AT THE STATE LINE WAS BEING UTILIZED.

THE CRITERIA THAT I ACTUALLY APPLIED WASN'T A ZERO FLOW, IT WAS 5 CFS AT THOSE GAUGES. SO IF THE FLOW AT THE GAUGES WERE 5 CFS OR LESS, IN MY OPINION, ESSENTIALLY THE RIVER WAS BEING FULLY UTILIZED. THE 5 CFS, I MIGHT ADD, WOULD ACCOUNT FOR RETURN FLOWS OR TRIBUTARY INFLOWS BETWEEN THE GAUGE AND PROBABLY THE POINT OF DIVERSION UPSTREAM. AND I MIGHT ALSO REFLECT THE FACT THAT NOT ALL OF THE FLOWS, 100 PERCENT OF THE FLOWS CAN BE EFFECTIVELY DIVERTED BY THE RIVER HEAD GATE. AT TIMES YOU CAN HAVE LEAKAGE AND UNDER FLOW AROUND THE GAUGE AND THERE WILL BE SOME SMALL AMOUNTS, PARTICULARLY WHEN YOU ARE DEALING WITH A WIDE RIVER CHANNEL.

FINALLY, THE LAST CRITERIA THAT I UTILIZED IN THE DAILY FLOW ANALYSIS WAS WHETHER THE FLOW AT THE GARDEN CITY GAUGE WAS LESS THAN A SPECIFIED AMOUNT. AGAIN, THE GARDEN CITY GAUGE REPRESENTS SORT OF THE BOTTOM END OF THE SYSTEM THAT I LOOKED AT. IT IS LO-

CATED ON KANSAS EXHIBIT 20, AND IS ABOUT 13 MILES BELOW THE LAST DITCH DIVERSION, THAT BEING THE FARMERS DITCH AND GARDEN CITY DITCH DIVERSION DAM.

THE FLOW RATES WHICH I UTILIZED FOR THE GARDEN CITY GAUGE ACTUALLY VARIED OVER TIME. THEY WERE ON THE AMOUNT OF 20 CFS FOR THE TIME PERIOD OF 1950 THROUGH '72, AND 5 CFS STARTING IN U.S.G.S. WATER YEAR 1973.

THE REASON FOR THE DECREASE IN THE MIDDLE OF MY STUDY WAS TO ACCOUNT FOR SOME OF THE DISCHARGES THAT OCCURRED THROUGH THE GARDEN CITY POWER PLANT AND BEET PLANT, THAT I BELIEVE THERE HAS BEEN SOME TESTIMONY ABOUT PREVIOUSLY IN THIS CASE. THE 15 CFS CHANGE MORE OR LESS REPRESENTS AN AMOUNT TO ACCOUNT FOR THAT DISCHARGE.

THE DISCHARGE CEASED IN AND AROUND THE EARLY '70'S. I THINK ACTUALLY IN '75 OR '76, THEREABOUTS. BUT IT DECLINED SLOWLY IN THE EARLY '70'S. THAT IS WHY I CUT IT OFF A COUPLE OF YEARS EARLIER.

SPECIAL MASTER: YOU USED 5 CFS BEGINNING IN 1973 AND UNTIL WHAT YEAR?

THE WITNESS: THAT WAS UTILIZED UNTIL THE END OF THE STUDY PERIOD, UNTIL 1985. PRIOR TO THAT, 20 CFS WAS EMPLOYED.

WHENEVER THE FLOW THAT WAS RECORDED BY THE U.S.G.S. SURVEY, OR BASED ON THE ESTIMATE THAT I OBTAINED FROM THE DIVISION OF WATER RESOURCES FROM 1970 THROUGH '85, WAS BELOW THESE AMOUNTS, THEN I CONSIDERED ALL OF THE FLOW THEN OCCURRING AT THE STATE LINE TO BE USABLE.

SPECIAL MASTER: AND IF THE FLOWS WERE ABOVE THOSE AMOUNTS, YOU CONSIDERED THEM NOT TO BE USABLE?

THE WITNESS: YES. I CONSIDERED ANY ADDITIONAL FLOWS THAT WOULD OCCUR AT THE STATE LINE WOULD NOT BE USABLE.

I THINK THAT SUMMARIZES THE GENERAL CRITERIA THAT I APPLIED.

AND THE MANNER IN WHICH I APPLIED THIS CRITERIA WAS TO LOOK AT EVERY DAY IN THE STUDY PERIOD, 1950 THROUGH '85, TO MAKE A DECISION, USING THE DATA THAT WAS AVAILABLE THAT I DESCRIBED AND THESE GENERAL CRITERIA TO JUDGE WHETHER IN MY OPINION ON THAT DAY MORE WATER COULD HAVE BEEN USED OR NOT. IN LOOKING AT, OBVIOUSLY MANY DAYS, AND I DON'T HAVE THE NUMBER IN FRONT OF ME, BUT EACH DAY FROM 1950 THROUGH 1985.

BY MR. DRAPER:

Q. SO HOW DID YOU ACTUALLY GO ABOUT APPLYING THE CRITERIA? DID YOU HAVE A SPREAD SHEET THAT CONTAINED ALL OF THIS INFORMATION?

A. IN ORDER TO LOOK AT THE DATA ON A DAY-BY-DAY BASIS, I DID PUT IT INTO A SPREAD SHEET WHICH WOULD ILLUSTRATE THE DATA AND SOME VARIOUS CALCULATIONS, UTILIZING THE DATA TO HELP INDICATE WHETHER NOT ON A GIVEN DAY WHETHER ALL OF THE FLOW WAS BEING USED. AND AN EXAMPLE OF THAT KIND OF SPREAD SHEET IS EXHIBIT 645.

Q. ALL RIGHT. LET'S TAKE A LOOK AT THAT EXHIBIT, IF YOU WOULD, PLEASE.

A. EXHIBIT 645 IS A SERIES OF 12 TABLES. ONE TABLE—OR ONE PAGE, THAT IS—FOR EACH MONTH DURING THE YEAR 1955. THIS IS A SAMPLE YEAR. THERE ARE ACTUALLY A SIMILAR SET OF PAGES OR

TABLES FOR EVERY OTHER MONTH IN THE STUDY PERIOD 1950 THROUGH 1985. EACH PAGE REPRESENTS ONE MONTH AND HAS THE DAILY VALUES OF THE DATA THAT I DESCRIBED DEPICTED ON IT. THE COLUMNS INDICATE, FOR INSTANCE, THE STATE LINE FLOW. IT ALSO INDICATES WHEN KANSAS IS CALLING FOR WATER, AND WHEN IT IS CALLING, THAT WOULD BE THE FOURTH COLUMN OVER LABELED "KANSAS CALL W/3 DAY LAG." I INCORPORATED A THREE-DAY LAG FOR—TO ADD ONTO THE CALLS TO TAKE INTO ACCOUNT THE TRANSIT TIME BETWEEN JOHN MARTIN AND THE STATE LINE.

THE SECOND COLUMN INDICATES WHETHER THE STATE LINE FLOW WAS IN EXCESS OR SHORTAGE OF THE—LET ME BACK UP. THE SECOND COLUMN OF NUMBERS OTHER THAN THE DAYS IS ENTITLED "EXCESS/SHORTAGE STATELINE FLOW." THAT REPRESENTS THE EXCESS OF SHORTAGE OF THE STATE LINE FLOW AS COMPARED TO THE KANSAS CALL.

NOW, THIS FIRST SHEET, OBVIOUSLY, IS IN OCTOBER AND THE ASTERISKS IN THE THIRD COLUMN WHERE THE COLUMN LABELED "KANSAS CALL W/3 DAY LAG" INDICATE THAT THE RESERVOIR WAS EMPTY ON THOSE DAYS. IF THERE IS AN "N/A" INSIDE OF THAT COLUMN, IT WOULD INDICATE THERE WAS WATER IN THE RESERVOIR, BUT IT WASN'T BEING CALLED THAT DAY.

Q. YOU ARE REFERRING TO THE FIRST PAGE OF EXHIBIT 645?

A. YES, THANK YOU.

MOVING FURTHER OVER IN THE SPREAD SHEET, YOU WILL SEE THAT THERE ARE DAILY VALUES REPORTED FOR SYRACUSE FOR THE GARDEN CITY GAUGE. I ALSO HAVE A COLUMN THERE, WHAT IS

THE FLOW AT GARDEN CITY WHEN KANSAS IS DEMANDING WATER FROM JOHN MARTIN. AND IT WOULD INDICATE A VALUE IN THAT COLUMN, A NUMERICAL VALUE IF THERE WAS A CALL ON ANY GIVEN DAY.

Q. THE COLUMN ENTITLED "FLOW AT GARDEN CITY," IS THAT THE INFORMATION FROM KANSAS EXHIBIT 644?

A. YES, THANK YOU. IF YOU COMPARE 644 FOR THE YEAR 1955, WATER YEAR 1955, THE NUMBERS IN THAT COLUMN WILL BE IDENTICAL TO THE ONES IN 644. 644 WAS THE COMPILATION OF DAILY FLOWS JUST AT GARDEN CITY.

SPECIAL MASTER: LET'S JUST TAKE A LOOK AT THAT COLUMN FOR A SECOND.

THE WITNESS: SURE.

SPECIAL MASTER: USING YOUR 20 CFS CRITERIA, THIS WOULD INDICATE THAT THE ONLY TIME THAT WAS EXCEEDED WAS ON THE 28TH AND 29TH OF THE MONTH WHERE IT WAS 22 CFS. IF YOU GO BACK TO THE STATE LINE FLOWS, THEY ARE 42 AND 41 ON THOSE TWO DAYS. THIS IS MAYBE TOO SMALL A CHANGE TO BE USING AS AN EXAMPLE, BUT I GUESS I DON'T QUITE UNDERSTAND THEN WHAT THE RELATIONSHIP WOULD BE. YOU INDICATED THAT IF MORE THAN 20 CFS DURING THIS PERIOD OF TIME WAS PASSING GARDEN CITY THAT YOU WOULD NOT CALL FOR ADDITIONAL FLOWS. SO DO YOU THEN CONSIDER THAT PART OF THE 42 AND 41 IS NOT USABLE?

THE WITNESS: YOUR HONOR, IF YOU LOOK OVER FURTHER TO THE RIGHT-HAND SIDE OF THE SPREAD SHEET, THERE IS A COLUMN LABELED "SWE USABLE FLOW?"

SPECIAL MASTER: YES.

THE WITNESS: WITH A ZERO EQUALLING "NO" AND A 1 EQUALING "YES." YOU WILL SEE THAT FOR THIS PARTICULAR MONTH, THE FIRST MONTH DEPICTED IN EXHIBIT 645, OCTOBER 1955, THAT ALL OF THE DAYS WERE IDENTIFIED AND DETERMINED TO BE DAYS WHEN ALL OF THE FLOW WAS USED WITH THE EXCEPTION OF THE DAYS FOLLOWING THE 25TH OF OCTOBER AND ON. ALL OF THOSE DAYS WERE NOT DAYS WHEN IN MY JUDGMENT THE FLOW WAS ALL USED. BUT FOR THE FIRST 24 DAYS OF THE MONTH. I DID CONSIDER THAT ALL OF THE FLOW WAS BEING USED.

I HAVE ANOTHER EXAMPLE WE WILL WORK THROUGH THAT MIGHT ANSWER SOME MORE OF YOUR QUESTIONS—

SPECIAL MASTER: ALL RIGHT.

THE WITNESS: —ABOUT HOW THE CRITERIA APPLY.

SPECIAL MASTER: ALL RIGHT.

THE WITNESS: BUT I DON'T KNOW IF YOU WOULD LIKE ME TO DO THAT FIRST OR FINISH THE DESCRIPTION OF THIS TABLE.

SPECIAL MASTER: WHY DON'T YOU FINISH THE DESCRIPTION FIRST?

THE WITNESS: OKAY.

SPECIAL MASTER: THEN LET'S COME BACK TO THIS.

THE WITNESS: THERE ARE COLUMNS FOR EACH OF PRECIPITATION GAUGES AND THEY INDICATE THE—THE VALUES INDICATE WHEN PRECIPITATION OCCURRED AND THE AMOUNT IN EXCESS OF ONE INCH PER DAY. SYR WOULD BE AN ABBREVIATION FOR SYRACUSE, G.C. WOULD BE AN ABBREVIATION FOR GARDEN CITY, AND LAK IS AN ABBREVIATION FOR THE LAKIN PRECIPITATION GAUGE.

BY MR. DRAPER:

Q. DOES THE .1 THAT APPEARS FOR THE 7TH OF THE MONTH INDICATE .1 INCH RAIN OR 1.1?

A. 1.1.

Q. SO THAT IS THE NET—

A. CORRECT.

THE NEXT SET OF COLUMNS WOULD BE ASSOCIATED WITH KANSAS—DAILY KANSAS DITCH DIVERSIONS. THEY ARE LUMPED INTO FOUR DIFFERENT CATEGORIES, THE FIRST CATEGORY BEING THE STATE LINE TO SYRACUSE DIVERSIONS. AND THEY WOULD INCLUDE THE FRONTIER, HOWITT, AND FORT AUBREY DITCH DIVERSIONS.

THE NEXT COLUMN, SYRACUSE TO SOUTH SIDE, WOULD BE THAT REACH OF STREAM THAT INCLUDES THE AMAZON, GREAT EASTERN AND SOUTH SIDE DITCH DIVERSIONS, IN OTHER WORDS, THE UPPER GARDEN CITY DIVERSIONS AS I HAVE DEFINED THEM EARLIER.

FINALLY, THE LAST COLUMN LABELED "BELOW SOUTH SIDE TO GAR. CITY" WOULD INCLUDE THE FARMERS AND GARDEN CITY DITCHES AND THEIR DIVERSIONS.

THE THREE DIFFERENT CATEGORIES ARE THEN ADDED UP IN THE TOTAL—DAILY KANSAS DITCH DIVERSIONS ARE ILLUSTRATED IN THE TOTAL COLUMN UNDER THE "KANSAS DITCH DIVERSION" HEADING.

FINALLY, THERE ARE SOME NET GAIN AND LOSS COLUMNS, WHICH TAKE INTO ACCOUNT THE GAUGE FLOWS AND THE DIVERSIONS IN BETWEEN THOSE GAUGES TO DETERMINE IS THERE A LOSS OR A GAIN IN THAT REACH DURING THAT PARTICULAR DAY.

THE NEXT COLUMN IS THE SYRACUSE LESS UPPER GARDEN CITY DITCH DIVERSIONS AS A INDI-

CATOR OF WHAT WAS GOING ON THAT DAY IN RELATION TO THE ACCUMULATED DIVERSIONS FOR THE UPPER GARDEN CITY DITCHES AS OPPOSED TO THE SYRACUSE. IT WOULD REPRESENT, FOR INSTANCE, ON THE FIRST DAY—OR ON ALL OF THE DAYS IT WOULD BE THE SYRACUSE FLOW LESS THE COLUMN LABELED "SYRACUSE MINUS SOUTHSIDE KANSAS DITCH DIVERSIONS."

THE NEXT TWO COLUMNS INDICATE THE AMOUNT—OR SW USABLE FLOW QUESTION MARK INDICATES WHETHER IN FACT THAT DAY IN MY JUDGMENT WAS A DAY WHEN ALL OF THE FLOW WAS USED OR NOT. AND THE USABLE STATE LINE FLOW AMOUNT JUST CARRIES OVER THE FULL AMOUNT OF THE STATE LINE FLOW WHENEVER A 1 APPEARS IN THE PRIOR COLUMN. AND A ZERO, OF COURSE, WAS FOR THOSE DAYS WHEN A ZERO WAS RECORDED AT THE PRIOR COLUMN. AS AN EXAMPLE, THE FIRST DAY A 1 APPEARS SO THERE IS 27 CFS. IF YOU LOOK OVER TO THE STATE LINE FLOW COLUMN ON THE LEFT-HAND SIDE OF THE PAPER, THERE WAS 27 CFS AT THE STATE LINE.

LIKEWISE, LET'S LOOK AT THE 31ST DAY OF THE MONTH, AND YOU WILL SEE THAT THERE WAS—THERE WAS NO—THERE WAS SOME FLOW THAT WASN'T USABLE, I GUESS IS THE BEST WAY TO PUT IT ON THAT DAY, IN MY JUDGMENT. THEREFORE, THE USABLE STATE LINE AMOUNT, I JUST PUT ZERO IN THERE. SO IT WAS PLUS OR MINUS—I MEAN THE FULL THING OR NOT, THE FULL AMOUNT AT THE STATE LINE, DEPENDING ON THE DECISION AND THE AMOUNT SHOWN IN ANSWERING THE QUESTION WHETHER THERE WAS USABLE FLOW OR NOT THAT DAY.

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Appendix Item 25

Excerpt from R. vol. 109

May 14, 1992

(Cross-examination of Steve Vandiver)

[Pages 68-69]

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Q. LET'S TURN TO 1976, WHICH WOULD BE THE YEAR THAT INCLUDES THE BEGINNING PERIOD FOR THIS CURVE NUMBER 30. IF WE LOOK AT THE PAGE STARTING WITH 1976 AND CONTINUING BACK FOR THE SIX YEARS UNTIL 1982, IS THERE ANYTHING SIGNIFICANT ABOUT THE VALUES HERE THAT WOULD INDICATE TO YOU WHY THERE WASN'T A CHANGE IN THE RATING CURVE?

A. I THINK I HAVE TESTIFIED TO THAT. THERE WASN'T ANY MEASUREMENTS OR THERE WASN'T ANY FLOW ENOUGH TO MEASURE THAT WAS HIGH ENOUGH TO CHANGE THE END OF THE CURVE.

Q. OR ANY SECTION OF THE CURVE; IS THAT RIGHT? IT IS ESSENTIALLY ZERO ALL OF THE TIME?

A. THERE WAS A COUPLE OF LOW FLOW MEASUREMENTS, VERY LOW FLOW MEASUREMENTS, I THINK TWICE DURING THE YEAR, ONE IN MAY AND ONE IN SEPTEMBER, THAT WERE LESS THAN TWO-TENTHS OF A CFS.

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Appendix Item 26

Excerpt from R. vol. 115

May 22, 1992

(Direct Examination of Duane Helton)

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SPECIAL MASTER: WELL, BEFORE THE 1970'S, YOU JUST HAVE SAID THERE WAS REALLY NOT ANY LARGE IMPACT FROM WELLS IN KANSAS.

THE WITNESS: THAT IS CORRECT.

SPECIAL MASTER: SO DURING THE '70'S, WHERE YOU ARE CONCERNED, WE HAD THE SITUATION WHERE BOTH SIDES TENDED TO TAKE WHAT THEY COULD, AND ON A PROPORTIONAL BASIS, ACCORDING TO THEIR RIGHTS. BUT YOU ARE SAYING THAT DURING THAT PERIOD THAT THE WATER THAT KANSAS TOOK IMPACTED COLORADO IN AN ADVERSE WAY?

THE WITNESS: NO, SIR. I WILL NOT SAY THAT THE INCREASED THIRST IN KANSAS CAUSED INCREASED DEMANDS AGAINST CONSERVATION STORAGE DURING THE 1970'S. THE REASON I WON'T SAY THAT IS BECAUSE THE INFLOW INTO THE CONSERVATION STORAGE DURING MOST OF THOSE YEARS AND CERTAINLY DURING THE LATER YEARS WAS RELATIVELY SMALL. AND I BELIEVE THAT KANSAS WOULD HAVE CALLED FOR THE RELEASE OF ALL OF THAT WATER EVEN WITHOUT THE INCREASED THIRST.

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Appendix Item 27

Excerpt from R. vol. 116

May 26, 1992

(Cross-examination of Duane Helton)

[Page 69]

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SPECIAL MASTER: I UNDERSTAND THAT. YOU KNOW, WE HAVE GOT A LOT OF EVIDENCE AND A LOT OF DOCUMENTARY EVIDENCE ON THE MANAGEMENT OF THE PROGRAM THAT COLORADO UNDERTOOK WITH RESPECT TO WELLS. BUT I THINK THE QUESTION WAS, IF YOU TRIED TO OPERATE THE WELLS STRICTLY IN ACCORDANCE WITH THE PRIORITY SYSTEM, THEY WOULDN'T OPERATE VERY OFTEN, WOULD THEY?

THE WITNESS: THAT IS CORRECT.

BY MR. DRAPER:

Q. ISN'T THAT TRUE ALSO OF PRE-COMPACT WELLS?

A. I THINK THAT IS TRUE ALSO.

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Appendix Item 28

Excerpts from R. vol. 127

September 23, 1992

(Direct Examination of Steve Larson)

[Pages 117-121]

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THE OTHER THING — AGAIN, WE ARE TRACKING TWO RUNS OF THE MODEL. WE ARE NOT GOING TO BE TAKING THE ACTUAL HISTORICAL STREAMFLOWS AT THE BASE LINE AND RUNNING A MODEL WITH AN INSTITUTIONAL CONDITION AND COMPARING THE HISTORICAL FLOWS TO THE CALCULATED FLOWS OF THE CONDITION. WE ARE NOT GOING TO BE DOING THAT. WE DON'T DO THAT. WE COMPARE TWO RUNS OF THE MODEL SO THAT WE TRY TO TAKE ADVANTAGE OF THE POTENTIAL FOR ERRORS TO IMPROVE OUR RESULT. AND I THINK WE HAVE SEEN AGAIN THROUGH THE SENSITIVITY STUDIES PROVIDED BY THE U.S. THERE IS — THAT FACT CAN BE SEEN.

SPECIAL MASTER: TELL ME A LITTLE BIT MORE OF YOUR VIEW OF THAT. THAT IS ANOTHER CRITICISM THAT IN FACT THOSE DON'T ALWAYS CANCEL THEMSELVES OUT.

THE WITNESS: ABSOLUTELY, THEY DON'T ALWAYS CANCEL OUT. ALL WE CAN SEE IS THAT THERE IS A LESS SENSITIVITY OF THE DEPLETIONS THAN THERE IS TO THE ACTUAL CALCULATIONS OF STATE LINE FLOWS. AND I THINK, AS I SAID EARLIER, THAT IS A VERY FAVORABLE CONDITION, BECAUSE THE POTENTIAL ERRORS IN THE PARAMETER WILL NOT AFFECT THE DEPLETIONS CALCULATION AS MUCH AS THEY WILL AFFECT STATE LINE FLOW CALCULATIONS.

I DON'T THINK IT IS REALLY POSSIBLE TO LOOK AT THE UNCERTAINTY IN THE ESTIMATES OF DEPLETIONS, WHICH IS REALLY WHAT WE ARE LOOKING AT ANYWAY. I THINK WE ARE GETTING A LITTLE AHEAD OF OUR PRESENTATION HERE. BUT I THINK I TALKED ABOUT THIS EARLIER, YOU CAN USE MONTE CARLO

ANALYSIS TO TRY TO DO THIS. THAT'S BY TRYING — BY LOOKING AT THE UNCERTAINTY IN INDIVIDUAL PARAMETERS, YOU CAN CALCULATE THE UNCERTAINTY IN THE OUTCOME OVER SOME RANGE. BUT AS I SAID EARLIER, I AM NOT SURE THAT REALLY HELPS YOU TOO MUCH FROM A STANDPOINT OF, WELL, IF WE HAD THAT UNCERTAINTY CALCULATED FOR THE COLORADO ANALYSIS AND FOR THE KANSAS ANALYSIS, THEN WE COULD KIND OF COMPARE THE TWO AND SEE WHAT THE RELATIVE AMOUNTS OF UNCERTAINTY WERE IN THE TWO ANALYSES.

I DON'T THINK THAT CAN BE DONE WITH THE COLORADO ANALYSIS JUST BECAUSE OF LOGISTICS. I DON'T THINK IT IS FEASIBLE TO DO IT. WE MIGHT BE ABLE TO DO IT WITH THE H-I-M BY DOING THOUSANDS AND THOUSANDS OF RUNS. I THINK THERE ARE A LOT OF ASSUMPTIONS YOU WOULD HAVE TO MAKE. YOU WOULD HAVE ESTIMATES ON TOP OF ESTIMATES.

HOWEVER, I DON'T THINK THAT CHANGES THE CONCLUSIONS THAT YOU REACH. THAT IS, LIKE, FOR EXAMPLE, SUPPOSE THAT WE ESTIMATED DEPLETIONS OF 50,000 ACRE FEET AND THE MARGIN OF THE UNCERTAINTY IS — LET'S SAY, THE STANDARD DEVIATION OF THE ESTIMATE IS PLUS OR MINUS 30,000, WELL, THAT DOESN'T CHANGE THE FACT THAT WAS THE BEST ESTIMATE THAT YOU CAN PROVIDE. ALL IT TELLS YOU IS THERE IS SOME PROBABILITY THAT THE TRUE VALUE, WHICH WE DON'T KNOW, COULD BE LOWER OR COULD BE HIGHER. AND THE NARROWER WE GET THAT UNCERTAINTY, THE LESS PROBABILITY THAT THE TRUE VALUE LIES FURTHER AWAY FROM THE ESTIMATE THAT WE HAVE. IT DOESN'T CHANGE THE ESTIMATE. THE ONLY WAY THAT I CAN SEE TO REDUCE THAT UNCERTAINTY IS YOU HAVE TO HAVE

MORE DATA, MORE DETAILED DATA, AND WE DON'T HAVE THAT.

SPECIAL MASTER: DO ENGINEERS HAVE BASIC JUDGMENTS ABOUT SOME OF THESE THINGS — APART FROM THE MONTE CARLO ANALYSIS — WHERE YOU LOOK AT THIS, AND YOU SAY MY NUMBER IS A HUNCH, THAT IS THE BEST ESTIMATE, THAT IS WHAT EVERYTHING SHOWS, BUT I COULD BE PRETTY SURE THAT IT IS BETWEEN 90 AND 100, SOMETHING LIKE THAT, THE REAL FACTS ARE SOMEWHERE IN THAT NEIGHBORHOOD?

THE WITNESS: I THINK WE CAN DO THAT FOR THE PREDICTION OF THE STREAMFLOWS. THE PROBLEM IS TRYING TO DO IT FOR THE PREDICTION OF DEPLETIONS, WHICH ARE REALLY THE ESSENCE OF THE ANALYSIS. AND THERE YOU DO HAVE THE CORRELATED ERROR PROBLEM YOU HAVE TO DEAL WITH. AND THE ONLY WAY THAT I KNOW OF GETTING AROUND THAT IS TO DO THE MONTE CARLO ANALYSIS. AND I DON'T KNOW THAT IT IS REALLY FEASIBLE. AND AGAIN, I AM NOT SURE THAT IT HELPS TO MAKE THE DECISION, BECAUSE THE ESTIMATED VALUE STILL IS YOUR BEST ESTIMATE. IT IS JUST MAYBE A HIGHER OR LOWER PROBABILITY THAT THE TRUE VALUE COULD BE DIFFERENT BY SOME AMOUNT OR ANOTHER.

SPECIAL MASTER: ALL RIGHT.

BY MR. DRAPER:

Q. NOW, WE HAVE TALKED ABOUT DIFFERENCES BETWEEN THE TWO MODELS. ARE THERE AREAS IN WHICH THE RESULTS OF THE KANSAS AND COLORADO ANALYSES AGREE?

A. WELL, I THINK IT IS CLEAR FROM BOTH OF THE ANALYSES THAT THERE ARE TRENDS IN STREAMFLOW DEPLETIONS AS A RESULT OF THE INCREASED PUMPING IN COLORADO. I THINK THAT

IS PRETTY UNAMBIGUOUS FROM BOTH OF THE ANALYSES.

SPECIAL MASTER: SAY THAT IN A LITTLE MORE DETAIL.

THE WITNESS: WELL, WE'LL GET TO AN EXHIBIT IN A MOMENT HERE.

SPECIAL MASTER: ALL RIGHT.

BY MR. DRAPER:

Q. I BELIEVE THAT EXHIBIT IS PLAINTIFF'S 695.

IS PLAINTIFF'S EXHIBIT 695 AN EXHIBIT YOU PREPARED?

A. YES, IT IS.

Q. WHAT DOES IT SHOW?

A. THIS SHOWS THE TOTAL ANNUAL DEPLETIONS — AND THIS WOULD BE DEPLETIONS AND ACCRETIONS — FOR THE TWO DIFFERENT ANALYSES. ONE IS THE COLORADO WATER BUDGET ANALYSIS AND THE OTHER IS THE ANALYSIS USING THE H-I-M BUT WITH THE COLORADO PUMPING ESTIMATES. AND THAT IS IN BLUE. THAT IS THE SAME SCENARIO 2 ON EXHIBIT 642.

SPECIAL MASTER: THE BLUE BARS INCLUDE THE COLORADO PUMPING ESTIMATES?

THE WITNESS: THE COLORADO PUMPING ESTIMATES USED IN THE H-I MODEL. NOW, REMEMBER, IT IS NOT —

SPECIAL MASTER: I UNDERSTAND THE DISTRIBUTION MAY NOT BE QUITE THE SAME.

THE WITNESS: EXACTLY. BUT AGAIN, IT IS AN ATTEMPT TO TRY TO PUT THINGS ON A MORE EVEN SCALE FOR COMPARISON PURPOSES.

AND THIS SHOWS THE ANNUAL VALUES FOR EACH YEAR FOR THE TWO ANALYSES, THE COLORADO WATER BUDGET ANALYSIS AND THE HYDROLOGIC-INSTITUTIONAL MODEL.

BY MR. DRAPER:

Q. IS IT POSSIBLE TO DRAW ANY CONCLUSIONS FROM THIS COMPARISON?

A. YES, I BELIEVE IT IS. I THINK YOU CAN LOOK AT THIS EXHIBIT AND SEE THE TREND OF INCREASE IN BOTH OF THE ANALYSES AS A RESULT OF HIGHER LEVELS OF PUMPING. AND IN PARTICULAR, YOU CAN SEE THAT IN THE PERIOD FROM THE MID TO LATE 1970'S THAT BOTH ANALYSES SHOW THAT TO BE THE PERIOD OF HIGHEST DEPLETIONS IN TERMS OF AT LEAST SUSTAINED LEVELS OF THE DEPLETIONS FOR A LONGER PERIOD OF TIME. I THINK IT IS UNAMBIGUOUS TO ME THAT THERE ARE THESE TRENDS IN THE '70'S — THE LATE '70'S, THE PERIOD OF HIGHEST DEPLETIONS. I THINK IT IS CLEAR FROM BOTH ANALYSES THAT THAT'S THE CONCLUSION THAT YOU WOULD DRAW.

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[Pages 123-24]

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Q. I'M NOW READY TO TURN TO ANOTHER SUBJECT, NAMELY, USABLE FLOW.

MR. HELTON HAS SUGGESTED THAT THE H.C.I. ANALYSIS IS PREFERABLE TO THE SPRONK ANALYSIS WITH RESPECT TO USABLE FLOWS.

DO YOU AGREE WITH THAT, MR. LARSON?

A. NO, I DO NOT.

Q. WHY NOT?

A. WELL, THERE ARE A COUPLE OF REASONS. FIRST OF ALL, THE STREAMFLOWS DURING THE LATE 1970'S AT THE STATE LINE WERE VERY LOW. AND THUS, I THINK DURING THIS PERIOD, IT IS CLEAR

THAT THE USABILITY OF STREAMFLOW IN KANSAS WOULD BE VERY HIGH DURING THAT PERIOD. THIS PERIOD OF HIGH USABILITY IS COINCIDENT WITH THE PERIOD OF HIGH DEPLETIONS THAT WE HAVE SEEN AS CALCULATED BY BOTH OF THE ANALYSES — THAT IS, BOTH THE COLORADO ANALYSIS AND OUR ANALYSIS USING THE HYDROLOGIC-INSTITUTIONAL MODEL — CLEARLY SHOW THE HIGHER DEPLETIONS ARE DURING THIS PERIOD IN THE 1970'S WHEN THE STREAMFLOW WAS VERY LOW. AND AS A RESULT OF THAT, THE H.C.I. METHOD WHICH RELIES ON AVERAGES WILL UNDERESTIMATE THE USABLE DEPLETIONS BECAUSE OF THAT — OF THE COINCIDENT NATURE OF THE HIGH DEPLETIONS AND THE HIGH USABILITY.

Q. AND HOW DOES THAT COMPARE TO THE H.C.I. METHOD?

A. THE H.C.I. METHOD RELIES ON AVERAGES. SO THAT DURING THAT PERIOD, BECAUSE IT IS USING AN AVERAGE CONDITION, WILL UNDERESTIMATE THE AMOUNT OF USABLE DEPLETIONS DURING THE PERIOD WHERE THE USABILITY WAS VERY HIGH.

SPECIAL MASTER: H.C.I. WAS THE ORIGINAL METHODOLOGY SUGGESTED BY MR. DURBIN?

THE WITNESS: YES.

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[Pages 132-33]

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SPECIAL MASTER: BOTH MR. HELTON AND MR. SCHROEDER HAVE TALKED ABOUT INCREASED

THIRST FOR RECHARGE AS A RESULT OF THE INCREASED PUMPING IN KANSAS.

DO YOU HAVE A COMMENT ON THAT?

THE WITNESS: WELL, I THINK EXHIBIT 698 TENDS TO GO TO THAT ISSUE FROM THE STANDPOINT — AS I UNDERSTAND SOME OF THE CRITICISM — A LOT OF IT IS FOCUSED ON THE LATE PORTION OF THE STUDY PERIOD. AND THE POINT THAT I WANTED TO MAKE WITH EXHIBIT 698 WAS, SO FAR AS 1975, YOU COULD USE EITHER METHOD AND GET VERY COMPARABLE AMOUNTS, DEPLETIONS TO USABLE FLOWS.

THE SECOND POINT THAT I WANTED TO MAKE WAS THAT THE USABILITY IN THE LATE 1970'S, IN MY VIEW, WAS VERY HIGH, NO MATTER HOW YOU EXAMINED IT. THE STREAMFLOWS WERE VERY, VERY LOW. AND AS A CONSEQUENCE, USABILITY OF WATER IN KANSAS WOULD BE VERY, VERY HIGH. AND BECAUSE THAT IS COINCIDENT WITH THE PERIOD WITH BOTH ANALYSES — THAT IS THE ANALYSES PRESENTED BY COLORADO AND THE ANALYSES WE CONDUCTED USING THE HYDROLOGIC-INSTITUTIONAL MODEL — SHOW THE HIGHEST LEVEL OF DEPLETION. I THINK IT IS CLEAR THERE ARE GOING TO BE SIGNIFICANT DEPLETIONS DURING THAT PERIOD. AND BECAUSE THE AVERAGING METHOD OF H.C.I. USES AN AVERAGE DURING THAT PERIOD, THAT EXPLAINS WHY WE GET A DIFFERENCE WHEN WE USE THE SPRONK METHOD. AND SO I THINK MY RESPONSE TO THAT WOULD BE THAT THE USABILITY DURING THAT PERIOD WAS VERY HIGH IRRESPECTIVE OF THOSE KINDS OF CONCERNS.

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Appendix Item 29

Excerpt from R. vol. 128

September 24, 1992

(Cross-examination of Steve Larson)

[Pages 107-108]

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SPECIAL MASTER: IS THAT CORRECT, YOU HAVE SUCH A GENERAL SENSE IN MIND?

THE WITNESS: YES, I HAVE A GENERAL SENSE.

SPECIAL MASTER: THEN I THINK SHE WANTS TO KNOW WHAT IT IS.

THE WITNESS: I THINK YOU CAN SEE BY LOOKING AT THOSE RELATIVE SENSITIVITIES THAT THE SENSITIVITY OF DEPLETIONS TO PARAMETER CHANGES IS SIGNIFICANTLY LESS THAN THE SENSITIVITY OF STATE LINE FLOWS. SO MY SENSE WOULD BE THAT THE UNCERTAINTY IN DEPLETIONS WOULD BE MUCH LOWER THAN THE UNCERTAINTY IN THE STATE LINE FLOWS.

BY MS. WEISS:

Q. WELL, DID YOU THINK DEPLETIONS ARE CALCULATED WITHIN A RANGE OF PLUS OR MINUS 50 PERCENT?

A. I HAVEN'T QUANTIFIED IT.

Q. I UNDERSTAND.

A. BUT I THINK IT IS LESS THAN THAT.

Q. LESS THAN 50 PERCENT?

A. YES.

Q. DO YOU THINK IT IS LESS THAN 20 PERCENT?

A. I'M NOT SURE.

Q. WHAT IS YOUR REACTION TO 10 PERCENT?

A. I'M NOT SURE THERE, EITHER.

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Appendix Item 30

Questions Presented, New Mexico's Brief in Support of Exceptions (Dec. 2, 1982), *Texas v. New Mexico*, 462 U.S. 554 (1983) (No. 65, Original) (excerpt)

A-163

IN THE

Supreme Court of the United States

OCTOBER TERM, 1982

No. 65, Original

STATE OF TEXAS,

Plaintiff

v.

STATE OF NEW MEXICO,

Defendant

UNITED STATES OF AMERICA,

Intervenor

BRIEF IN SUPPORT OF EXCEPTIONS

QUESTIONS PRESENTED

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1. Whether the Court may rewrite the voting provisions of Article V of the Pecos River Compact to provide for a tie-breaker, thus diluting the voting strength of the party states, eliminating the Compact's requirement of unanimity and foreclosing the right of each state to veto Commission action.

2. Whether the Court should review findings of fact the Commission made in 1962 where Texas, the plaintiff, disputes their validity and the validity of the Review of Basic Data on which they are based.